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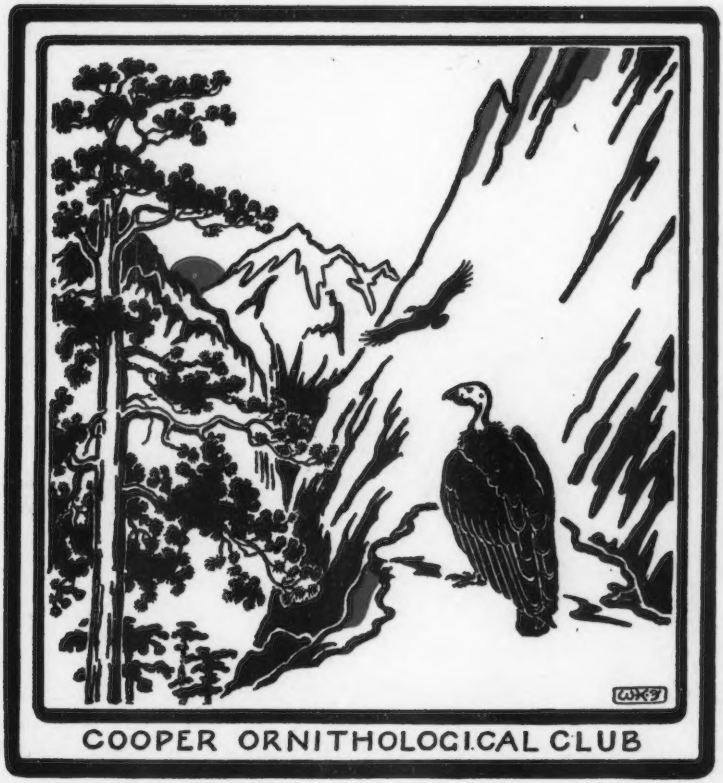
THE CONDOR

A Magazine of Western Ornithology

Volume XXXIX May-June, 1937 Number 3



COOPER ORNITHOLOGICAL CLUB

THE CONDOR

A Magazine of Western Ornithology

Published Bi-monthly by the Cooper Ornithological Club
Entered as second-class matter May 15, 1925, at the post-office at Berkeley, California, under Act of Congress of February 28, 1925, Section 412, paragraph 4.
Issued from the Office of THE CONDOR, Museum of Vertebrate Zoology, Berkeley, California.

SUBSCRIPTION RATES

Three Dollars per Year in the United States, payable in advance.
Fifty Cents the single copy.
Three Dollars and Twenty-five Cents per Year in all other countries in the International Postal Union.

COOPER ORNITHOLOGICAL CLUB

Dues are payable in advance on January first for the calendar year: Three Dollars per year for members residing in the United States; Three Dollars and Twenty-five Cents in all other countries. Members whose dues are paid receive THE CONDOR without additional charge.

The Life Membership fee is Seventy-five Dollars. No additional dues are required, and the money is invested and the interest only is used for Club publications. Life Members received The Condor without additional charge.

Send manuscripts for publication to the Editor, J. GRINNELL, Museum of Vertebrate Zoology, Berkeley, California, or to either of the Associate Editors, JEAN M. LINSDALE and ALDEN H. MILLER, same address.

Send dues and subscriptions to JOHN McB. ROBERTSON, Associate Business Manager, Buena Park, California; orders for back numbers of THE CONDOR and the PACIFIC COAST AVIFAUNA series to W. LEE CHAMBERS, Business Manager, 2068 Escarpa Drive, Eagle Rock, California

Issued May 15, 1937

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THE CONDOR

VOLUME XXXIX MAY-JUNE, 1937 NUMBER 3

RAPTORIAL BIRDS IN THE CLIFF AREAS OF LAVA BEDS NATIONAL MONUMENT, CALIFORNIA

WITH THREE ILLUSTRATIONS

By JOSEPH S. DIXON and RICHARD M. BOND

Tule Lake, a shallow body of water which at one time covered about 100 square miles, is located in northeastern California a short distance south of the Oregon line. Most of this lake has been drained, and the bottom has been given over to agriculture. However, a small central flooded area remains as a migratory wildfowl refuge administered by the Biological Survey.

Touching on the old south shore line of the lake, but several miles distant from the present body of water, the Lava Beds National Monument is a rugged area of recent lava flows and cinder cones, with a sparse cover of sagebrush, scattered ponderosa pines, and other Great Basin plants characteristic of the dry Transition and Upper Sonoran zones. Two miles northeast of the National Monument, and well out in the level lake bed where it was formerly almost surrounded by water, lies an area of highland, perhaps two miles long and from a hundred yards to three-fourths of a mile wide. This highland is bounded for much of its circumference by rocky cliffs, from 20 to more than 300 feet high, with faces seamed and pitted by innumerable potholes, cracks, ledges and crannies (see fig. 27).

On the smoother walls of the cliffs there is a series of petroglyphs, a number of which are preserved in an isolated tract which forms part of the National Monument. This highland is hereafter referred to as the "Petroglyph Cliff area."

The whole region about Tule Lake is abundantly supplied with birds of prey. Nesting birds of the main body of the Lava Beds National Monument include a dozen or more pairs of Sparrow Hawks (*Falco sparverius*), about eight pairs of Red-tailed Hawks (*Buteo borealis*), two pairs of Prairie Falcons (*Falco mexicanus*), a pair of Bald Eagles (*Haliaeetus leucocephalus*), and a good many pairs of Horned Owls (*Bubo virginianus*) and Barn Owls (*Tyto alba*).

But it is on and about the highland or Petroglyph Cliff area in the lake bed (a part of which is under the jurisdiction of the National Park Service) that birds of prey exist in numbers such as we have never encountered elsewhere. We believe that this extraordinary concentration of raptorial birds primarily results from the abundance of suitable nesting sites and the abundance of rodent prey. The numerous potholes in these cliffs (see fig. 28) offer cool, shaded, and protected nesting sites in an arid, barren region with high summer temperatures. Recent farming activities, with resultant crops of grain and alfalfa, have greatly increased the food supply of meadow mice and other small rodents in this area, thereby further augmenting their natural abundance. The lack of brush or other dense cover, which would conceal the rodents, is no doubt an advantage to hawks and owls and increases the chances for "good hunting." Air conditions suitable for relatively effortless flight are also believed to be a favorable factor for the birds.

Our investigations indicate that the ranges of at least some of the birds extend over about 100 square miles, but that the foraging is mainly confined to an area covering about 15 or 20 square miles. The total length of the cliffs where the birds nest and where our census of nesting birds was taken, according to Geological Survey maps and other maps, is somewhat over three miles, and the average height of these

Fig. 27. A section of the 300-foot Petroglyph Cliff showing old shore line at base, and pitted surface. In the small section shown in this photograph there were nesting, in May, 1936: 1 pair Rock Wrens; about 10 pairs of House Finches; about 60 pairs of Cliff Swallows; 1 pair Duck Hawks; 1 pair Prairie Falcons; 2 pairs Horned Owls; and 6 or 7 pairs of Barn Owls.

cliffs is over 100 feet. This rough estimate indicates that the total area of the cliff faces is slightly over one and a half million square feet. Separately or together, we have visited this area in December, 1935, April, May, June, and September, 1936; we have spent a total of 10 days and 2 nights in the region.

We shall discuss the raptorial birds in ascending order of abundance rather than in taxonomic succession. We saw birds or conservatively estimated the numbers as follows:

A pair of Duck Hawks (*Falco peregrinus*) was present in April, and incubating began early in May, but the birds either had been shot or driven away by visitors in June. A female Sparrow Hawk was on one of the cliffs in May, and a noisy pair

was present in late June. They were probably nesting, though the nest was not located. Apparently one or more pairs of Burrowing Owls (*Speotyto cunicularia*) were residents on the west side of the highland, where, for a short distance, there are no cliffs. One bird was seen there in May, and two late in June. Four Prairie Falcon nests were located, and two other localized pairs were seen. Four occupied nests of the Red-tailed Hawk were located, and at least one other nest apparently was present. Four Horned Owl nests were found, but several more probably were present. An adult female, collected May 9, was molting heavily. The stomach contained remains of kangaroo rat, meadow mouse, and cottontail rabbit.

Short-eared Owls (*Asio flammeus*) do not form a part of the true cliff population, but they were more abundant about the cliff area than in other parts of the lake bed. Possibly the air currents about the highland make it attractive. One nest was found by chance near the cliffs on May 9, with 4 nearly half-grown young (see fig. 29) and an addled egg. A dozen or more of these owls were usually seen flying or perched on the ground or on fence posts within half a mile of the north end of the cliffs in May, and another concentration was present about the same distance from the northwest part, where a nest was found. A third aggregation was found west of the south end of the cliffs, and there were scattered individuals elsewhere in the neighborhood. On the morning of May 9, 1936, Dixon counted, in a single hour, twelve Short-eared Owls that came to drink at a drainage ditch a short distance north of the petroglyph region. On this flat open farming land, scores of Short-eared Owls were seen, between 8 and 10 o'clock in the morning, hunting for meadow mice which were unusually abundant, especially in and about the alfalfa fields.

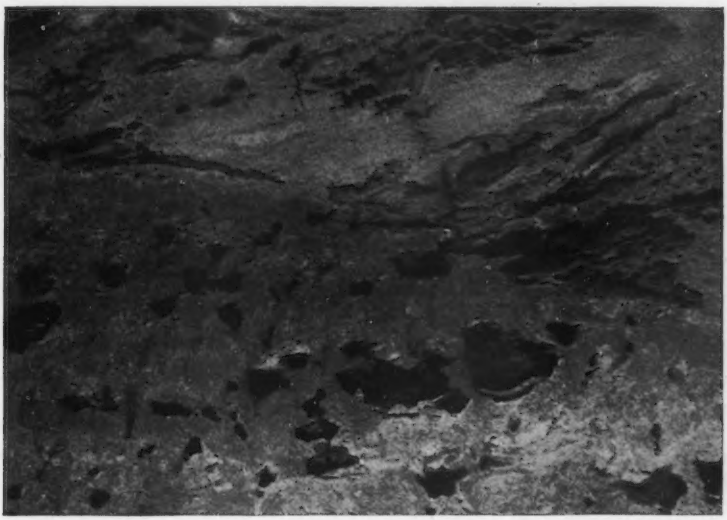

Fig. 28. Detailed photograph of Petroglyph Cliff showing young Horned Owl perched at entrance to nest (lower center). The numerous potholes here shown afford abundant cool, shaded and protected nest sites in an arid, hot, barren, flat region. Hundreds of birds ranging in size from House Finch to Western Red-tailed Hawk nested here in close proximity.

The most abundant nesting bird about the cliffs was the Cliff Swallow (*Petrochelidon albifrons*); possibly second place went to the Brewer Blackbird (*Euphagus cyanocephalus*), but more probably to the Barn Owl. We believe it quite safe to estimate that there were at least 300 Barn Owls on the three miles of cliffs in May, including a fair number of grown young of the year, but omitting nestlings that were unable to fly. Our estimate is based on a census of the owls inhabiting the cracks and potholes of the cliffs. The Barn Owls were not all counted individually, but the count was by "owl holes," that is, by counting each pothole or crack in the cliffs in which one or more owls were visible. A total of 49 owl holes or nesting sites was counted. A count of individual Barn Owls in 9 owl holes totaled 22, or an average of 2.4 per hole, which is considered to be a conservative average for all owl holes. This figure means that the 49 counted owl holes contained about 117 *visible* owls. Since many of the smaller cliffs were not searched for owls at all, since a great many potholes too deep to see into, showed evidence of use by Barn Owls, and since many of the owl holes or nests were found to harbor more owls than those visible at the entrances, we concluded that it was conservative to place the total barn owl population of the combined cliff areas at 300. Our night observations showed that this estimate was conservative. No careful count or estimate was made in December, but Barn Owls were certainly abundant then. From those seen, and from pellets and dead mice found along the cliff bases, we estimated that at least 100 were present in December.

Other birds of prey seen occasionally at various seasons over or on the cliffs but not found nesting included Turkey Vultures (*Cathartes aura*), absent in winter, Ferruginous Rough-legs (*Buteo regalis*), American Rough-legs (*Buteo lagopus*), and Marsh Hawks (*Circus hudsonius*).

Some interesting notes were made on the inter-relationships of raptorial birds. Despite the concentration of these birds, they appeared to exist with surprisingly little friction. A pair of Prairie Falcons nested slightly over 100 yards from the Duck Hawks' nest, but the two species appeared to be on the best of terms. The various pairs of Red-tails (nesting at a greater distance from the falcons) were never seen to engage in any sort of combat with their neighbors, even the owls. The Duck Hawks became irritable when disturbed, and they vented most of their temper on the Horned Owls nesting almost directly below them, striking at them and trying to dislodge them from the cliffs, though rarely making contact. The owls snapped their beaks and hooted in return, but they stayed where they were. One of the owls was induced to fly by the sound of a gunshot. It was struck by a Duck Hawk before it could reach shelter, but it did not seem to be much damaged. Barn Owls that decided to change their roosts by day were struck at occasionally by the Prairie Falcons, and two were hit though not hurt. One dead Barn Owl was found in June, however, that had been killed apparently by a Prairie Falcon or Duck Hawk. A Prairie Falcon struck at a flying Horned Owl without actually hitting it.

In April, May, and June, below the nest of the Duck Hawk, remains were found of a Mallard, a Ring-necked Pheasant, one Rock Wren, one Mountain Bluebird, one Western Meadowlark, and at least two Brewer Blackbirds. Various Prairie Falcons were believed responsible for remains of a Red-shafted Flicker, Horned Lark, Mountain Bluebird, Western Meadowlark, Brewer Blackbird, and a considerable number of Oregon ground squirrels. A male Prairie Falcon was seen to capture a mouse (probably *Microtus*) and return with it to its nest. The discrepancy between the magnificent stoop of the falcon and the small and ignoble prey seemed ridiculous.

Because of the inaccessibility of Red-tailed Hawk nests on the cliffs, few data

were obtained on the food of this species, though one nest contained part of a black-tailed jack rabbit. Another nest investigated on the lava beds contained, at different times, meadow mice, a kangaroo rat, and a Washington cottontail. The food of the Barn Owls, however, was abundantly evident. The meadow mouse (*Microtus montanus*) must represent well over 90 per cent of it. It is possible, on the strip of ground along the bases of the cliffs, of which perhaps an acre may be said to be practically paved with rodent bones, to find the remains of a good many northern California kangaroo rats, and occasionally white-footed mice, wood rats, pocket gophers (*Thomomys*), jack rabbits and cottontail rabbits. Lower jaws of meadow mice could have been collected by the wheelbarrow load.

Fig. 29. Four young Short-eared Owls in their nest on open ground below the high cliff of the so-called "peninsula" area.

In former times the waters of Tule Lake lapped the base of Petroglyph Cliff, but now, owing to diversion of the water for irrigation, the cliffs are separated from the present lake by several miles of alfalfa and grain fields. These fields afford ample food for meadow mice which in May, 1936, were exceedingly abundant there, and which could be seen running about, hunting for food at all hours of the day.

On the level ground, 30 feet below a Barn Owl nest at the Petroglyph Cliff, Dixon found evidence of the extensive destruction of meadow mice by these owls. In an area 6 by 35 feet, were found the following recently killed but whole rodents: 42 meadow mice, 8 white-footed mice, 1 house mouse and 1 kangaroo rat. These 52 rodents represented merely some discards that accidentally dropped from the owl's nest. It has been our experience that under such circumstances, where mice are abundant, an owl makes no effort to retrieve a mouse once dropped from the nest; the bird prefers to leave it and fly forth in search of another victim. From an examination that we made of a large number of recent pellets under one Barn Owl nest, we concluded that the 52 dead discarded mice that we counted below this Barn Owl nest represented only about one-sixth of all the mice caught by that one pair of Barn Owls in a two-weeks period. As evidence supporting this statement, Dixon counted incisor teeth of 243 meadow mice in fresh pellets collected under another Barn Owl nest. It is obvious that the hawks and owls in the Petroglyph Cliff area kill hundreds of thousands of mice each year.

While there are many other factors to be considered, we wish to point out that present conditions in the farm lands of the Tule Lake Basin seem unusually favorable for a mouse plague such as occurred at Buena Vista Lake in California and in the Carson Valley, Nevada. The helpful part that beneficial species like the Barn Owl play in rodent destruction in such instances should be realized by hunters, farmers and all other residents of the area involved.

Even in a region so thinly populated by people as this, the birds of prey could hardly exist in great numbers unless they were viewed with a degree of tolerance; however, there is still a good deal of room for improvement. On various visits to the area we found a number of dead hawks and owls which, judging from shot or bullet holes, were killed by firearms in the hands of hunters.

In order to secure more adequate protection for the many beneficial birds that nest there, and to protect better the important rock carvings from recurrent vandalism, it is desirable that some cliff areas which now lie largely outside the Monument, receive monument status. These areas have outstanding wildlife values which should be more adequately safeguarded and protected.

Wildlife Division, National Park Service, October 6, 1936.

COMMUNAL THOUGHT VERSUS INSTINCT

By ROBERT S. WOODS

Modern science rightly insists that when we encounter phenomena the causes of which cannot clearly be traced, we must, before definitely attributing them to influences which have not been proved to exist, demonstrate that they cannot be the results of known forces. Even the most conservative, however, can hardly object to an examination of the implications of any theory, no matter how slight its factual basis; in this task one may open other avenues of approach to a determination of the truth or falsity of the premise.

The work of psychologists of high standing has made it possible for us to speak of thought transference as an entirely natural occurrence, without any taint of the occult or ghostly. The ability to receive such mental messages is conspicuously developed in only a few persons, and it seems to be in no way a product of civilization or learning, but may well be thought of as a vestigial faculty, the need for which has largely been removed by the development of the power of speech. It may be comparable, perhaps, to the accurate sense of direction which is possessed by certain persons, but which is much more general and essential among migratory animals.

According to many credible accounts, social animals such as ants, bees, and even rats show a coordination in their efforts which would be difficult to explain satisfactorily without assuming some form of intercommunication. The performance of remarkable engineering feats further suggests that the common mind, if such there be, must be much superior to that of any single individual. In watching the flight of shore birds or other gregarious species, one is frequently impressed by the more than military precision with which their evolutions are executed. Some authorities have credited this apparent unanimity to an almost miraculous quickness and accuracy of perception and response, together, of course, with the absolute submission of all individuals to the will of some supposed leader; but the explanation would certainly be easier if we could conceive of some sort of volitional coordination among the members of the flock.

Of course the idea of a communal directing intelligence in the case of social animals is not a new one, but the possibility of a community of thought among non-gregarious individuals is one which had not occurred to the present writer, at least, until the discovery, in two different years, of remarkable similarities in the sites chosen by hummingbirds nesting at the same time and some distance apart (Condor, vol. 38, 1936, pp. 225-227). Even though these similarities may have had an origin entirely different from the one surmised, the mere possibility leads to speculation as to the part which this principle might play in some of the unsolved problems of bird behavior, notably those connected with migration.

Recent experiments of various ornithologists have shown that in the higher latitudes, at least, the migratory impulse has a physiological basis and is governed by seasonal changes in the length of the days and hence of the bird's daily periods of activity. That the adult birds possess an accurate memory or sense of direction and location cannot well be doubted, even though we may not understand the exact nature of the faculty which so infallibly guides them in their semiannual journeys. More difficult to explain, however, is the ability of young birds, traveling alone and sometimes in advance of their parents, to fly over an unknown course to the ancestral winter range which they have never seen. It is here that the broader conception of communal thought furnishes a plausible solution.

It may be hard to believe that any sort of communication could be maintained between adults and young when they are separated by hundreds of miles, but human experience with telepathy seems to indicate that distance is a minor factor, and that the bonds of relationship or sympathy are the most efficient conductors of thought. Or again, one might imagine the drawing up of a mental chart of the migration route in the subconscious minds of the young birds before they had left the company of their parents. In any case, this hypothesis should require the exercise of no more credulity than the alternative that the knowledge and experience of past generations are transmitted through an egg.

Certainly one of the puzzling problems of zoology has been that of instinct in general, as distinguished from reflex action on the one hand and reason or free choice on the other, and considered as a hereditary force inherent in the organism but founded upon the past experience of the species. Avoiding the greater uncertainties involved in an analysis of insect behavior, and regarding only the higher forms of life in which we may more confidently look for evidences of conscious intelligence, the whole idea of specialized instinct might perhaps be resolved into this conception that the accumulated wisdom of the past, kept ever fresh by constant application, is directly absorbed by the maturing minds of each new generation. As before intimated, it would be necessary to assume that relationship rather than propinquity is the governing factor in the transmission of knowledge, or the young of parasitic species would learn the habits of their foster-parents rather than those of their own kind.

As one of the implications of this theory, we should be justified in applying more broadly than is customary among zoologists the criteria of human psychology and behavior in evaluating the conduct of the higher animals. It is true that many of their acts seem the result of unthinking instinct rather than conscious thought, but quite possibly this inability to adjust method to circumstances is simply a manifestation of that same mental rigidity which makes it so difficult for many people ever to change the pattern of thought around which their minds were built during their formative years.

Azusa, California, January 18, 1937.

NOTES ON COLORATION AND HABITS OF THE CHESTNUT-COLLARED LONGSPUR

WITH FOUR ILLUSTRATIONS

By A. DAWES DuBOIS

April 14, 1915, a new bird song announced the arrival of an interesting stranger at my premises. My unknown visitor stood before me on the top of a fence post, singing an attractive little song in a voice which had, I thought, a suggestion of bluebird quality. He was a jaunty fellow, with a collar of bright chestnut behind his black cap. There were yellow ornaments on his face and neck, his throat was bright yellow, and an apron of unbroken lustrous black extended over his breast and abdomen. Having thus announced himself, he flew down and was lost in the meadow grass of a prairie slough. It was I who was, in truth, the newcomer; my caller was an old-time summer resident of the neighborhood. His name, as I learned soon afterward, was *Calcarius ornatus*.

The adult male in this ornate nuptial plumage is easily recognized in the field. The features mentioned, together with the pure white lining of his wings when he spreads them, make him a striking figure. The typical female, a plain sparrow-like bird, is not so easy to identify, but the tail pattern is similar to that of the male, and if this feature is definitely observed when the tail is spread in flight, it will serve to distinguish the females of the Chestnut-collared Longspur from females of the McCown Longspur. In both species the tail is largely white, but the white is cleft by a dark median stripe which widens at the end of the tail into a terminal band. In the chestnut-collared species, when in flight, the widening of the dark stripe proceeds with gradually curved outlines, forming a fan-shaped area at the end of the tail; thus the white areas have curved inner boundaries. In McCown Longspurs the dark terminal band does not appear fan-shaped; it is much more like the cross stroke of a letter T, making the white area at each side nearly rectangular. When the female Chestnut-collared Longspur is seen at close range, as she sits in her nest, a broad light streak is noticeable extending through the middle of her crown.

A male specimen in hand, of date May 2, showed the iris to be very dark brown; bill blackish above, pale blue-gray beneath, yellow-green at base except the part above nostrils; tarsus blackish-brown; toes black.

Fig. 30. Chestnut-collared Longspur bringing food, on three different occasions, for the young in nest number 14; photographed July 18, 1916.

These notes were made in the vicinity of Dutton, in Teton County, Montana. The Chestnut-collared Longspur is said to be a common summer resident of the prairie region of Montana as far west as the bases of the easternmost ranges of the Rocky Mountains (Saunders, Pac. Coast Avif. no. 14, 1921, p. 114), but the species was only moderately common in my immediate vicinity and seemed to be locally distributed, even in the limited area of these observations. Although associated in a general way with McCown Longspurs and Horned Larks, it preferred to make its home in the borders of wet hollows or marshy spots of the prairie.

The spring migrations took place in mid-April, the dates of first arrival at my station being April 14, 13, 20, and 13, in four successive years. Within two or three days after the first arrival, the species was present in its usual numbers.

In the fall the longspurs are shy when approached. Their habit of wandering about at that season may cause them to be absent from a given locality though they have not yet left for the south. One year they were apparently absent when I looked for them on August 2, 4 and 8, but young were seen on the 15th. My notes for August 29 of the second year mention the presence of several birds believed to be of this species.

During the nesting season the males often execute a little song flight, which, though not especially notable in itself, is very pleasing because of the melodious song which accompanies it.

On May 8, as I walked along the margin of a meadow, a bird flushed from the grass ahead of me, and a few moments later I was looking into my first nest, which contained four rather handsomely marked eggs. It was well concealed in a tuft of grass which stood up all around it. In the course of four years, twenty-two nests were found. They were described, and nesting dates and other items directly related to nidification were given, in the *Condor* (vol. 37, 1935, pp. 68-72).

In almost every instance, the nest was found by flushing the female bird. In one place, the ground hollow, prepared to receive the nest, was found accidentally before the nest was built (nest 5). It was at a point that I passed almost daily.

After a nest has been discovered, the birds are watchful but not demonstrative. While a nest is being examined, the parent birds can often be seen somewhere in the neighborhood. In several instances I noticed the male in the vicinity when the female was first flushed from the nest or while she sat in the nest upon my subsequent return to it. One male flew around me while the female was in the nest. Another circled over the nest to warn his mate of my approach (second visit) and she left the nest before I could get close to it. At another nest the female flew around me a time or two after I had flushed her. One female returned to her nest while I sat near it (nest 19).

The eggs are deposited daily, probably in the early part of the morning. The

Fig. 31. Chestnut-collared Longspur about to leave rock near nest number 14, after feeding the nestlings; photographed July 19, 1916.

complement is usually four; occasionally it is five. It seems reasonably certain that the duties of incubation fall wholly upon the female; the mother bird was definitely observed incubating in sixteen of the nests found (not counting nos. 9 and 14).

The young are hatched with an upper covering of natal down which appears long and fluffy as soon as dry. It is almost white, tinged with brownish gray. The mouth lining of nestlings is plain pink. By the time they are seven days old they are feathered; a brood of four completely fills the nest.

Presumably the Chestnut-collared Longspurs are subject to about the same mishaps as the other terrestial birds of the region, though their nests are so well hidden that they are not apt to be found by sight alone. Only one nest of this species was under observation at the time of a prolonged storm; in that nest the four young perished. The eggs mysteriously disappeared from one nest before hatching time.

In the article cited, several anomalous conditions were recorded. Among them was an abnormal mortality among the nestlings. In nest 11, four eggs hatched, but only two nestlings were alive the day before leaving time (sharing the nest with the body of one that had died). The next day there was only one survivor; and one carcass was found a few inches away. At nest 14 the four eggs hatched, but a nestling died when eight or nine days old. I did not find parallel cases of death without violence among nestlings of the other ground-nesting birds.

Fig. 32. Chestnut-collared Longspur bringing food for the young in nest number 14; photographed July 19, 1916.

On July 19 I witnessed the removal of the dead fledgling from nest no. 14. It was a surprising feat of strength, for the fledgling was very heavy, being eight or nine days old. Upon rapidly fluttering wings the parent rose with his burden straight upward from the nest; then it flew horizontally, and, while flying low, dropped the carcass at a spot about fifty feet away.

At the time and place of these observations there was a peculiar phase of female plumage, approaching the coloration of the males. This tendency was observed at four nests. Upon finding nest no. 9 (June 10, 1916), near the corner of the cabin yard, I wrote in my notes that a male was incubating the four eggs; for it was plain that the bird on the nest had the plumage of a male. Three days later I added a comment that the male in the nest was rather dull, and that a bright-plumaged male on a fence post not far from the nest seemed agitated at my presence. In this nest there was no fabricated structure; the eggs rested on a mere mat of dead grass in the bottom of the earth hollow, the bare earth forming the only walls. I did not witness the feeding of the young; they were killed by a rainstorm which occurred from June 21 to 23.

About two weeks later (July 7), just back of the cabin yard, a new nest was

found containing four eggs (nest 14). Later that day I saw the parent bird incubating; here again, to all appearances, was a male in the nest. But the incubating bird was no doubt a female despite her feathers. Her partner was often observed. In comparing them four days after the nest was found, I could see that the plumage of this bird was not nearly so bright as that of her mate, though she had all the male markings. This was probably the pair from unsuccessful nest no. 9. I placed a rock near the nest to serve as a stopping place and lookout for the birds. Several photographs were made of the parents standing on this rock. The three photographs, A, B and C, of figure 30, are obviously all of the same bird (note the light patches at sides of breast), while figure 32 is a photograph of the other bird. Both of the birds are shown carrying food for the young.

The next nest found (nest 15, July 19) contained eggs which were being incubated by a female of an intermediate type. She had partly taken on the male plumage, with blackish breast and abdomen.

Again the following year (nest 19, June 23), I found a female of intermediate plumage, with blackish breast and belly similar to the underparts of the male but without the chestnut collar or other bright markings.

Fig. 33. Eggs of Chestnut-collared Longspur *in situ* in nest number 21; photographed June 6, 1918.

Inquiry concerning such plumages was subsequently made of two well-known museums. In one collection, which contained a large series of specimens of this species, all the females were said to differ from the males in the way described by Ridgway. In the other, three females (out of about thirty) were said to have assumed blackish feathers on breast and abdomen, and some chestnut ones on the back of the neck, but all these feathers were broadly tipped with pale buff, largely concealing the black and chestnut. There were no specimens that really resembled a male in full plumage.

One other anomaly, mentioned in the earlier article, was the occurrence in a given nest of two groups of eggs in unequal stages of incubation. In nest 10, which contained five eggs, three were nearly fresh while two were far advanced. In nest 19, which also contained five eggs, incubation had been well begun in four, while the fifth egg, which was lightly marked, was practically fresh.

Excelsior, Minnesota, December 12, 1936.

FREQUENCY OF OCCURRENCE OF BIRDS IN ALUM ROCK PARK, SANTA CLARA COUNTY, CALIFORNIA

WITH TWO GRAPHS

By JEAN M. LINSDALE and THOMAS L. RODGERS

Alum Rock Park, in the foothills of the Mount Hamilton Range, eight miles northeast of San Jose, California, occupies a canyon which in many ways typifies the hilly part of central California. Recently we were given opportunity to analyze bird records kept by several observers on 138 field trips to this park. From these we have determined the frequency index of each species, and we present the results here as indicating satisfactorily the ranking of the birds according to relative frequency of occurrence in this neighborhood. For the records we are indebted to the following persons whose notes were used for the numbers of days indicated: James Peterson, 99; Gayle B. Pickwell, 28; Miss Emily Smith, 10; Tom Rodgers, 1. The time covered extends from the spring of 1929 to the fall of 1936. Sometimes only part days were represented, and for most of the lists there was no anticipation that they would be used for the present purpose. Field days by months numbered as follows: January 8; February, 12; March, 11; April, 12; May, 11; June, 15; July, 7; August, 17; September, 9; October, 16; November, 5; December, 15.

This park contains approximately one thousand acres, and it is located in an east-west running canyon with a small permanent stream. The park occupies about three miles of the canyon and varies in width up to half a mile. The mouth of the canyon opens out to grass-covered hills having scattered California sage and baccharis; the stream sinks into the floor of the valley except in time of flood. Near the upper end of the park the canyon becomes narrow and steep, with about six hundred feet of fall in less than a mile. The south-facing slope of the canyon is covered with chaparral, with a few scattered digger pines on the ridges and scrubby live oaks in the draws. The north-facing slope is much the moister, with scattered valley and live oaks and, in the upper, steeper part of the canyon, digger pines and a few black oaks. California laurel, poison oak, coffee berry, and buckeye are also common, especially within a few hundred feet of the stream. On the canyon bottom there is a mixture of canyon and valley stream flora—white alder, big-leaf maple, elderberry, sycamore, willow, and live oak, with an undergrowth of wild blackberry, and tangles of wild cucumber and clematis along the stream and through the brush. In the wider parts of the canyon floor there are several cleared recreation areas, two buildings housing amusement concessions, and many picnic tables.

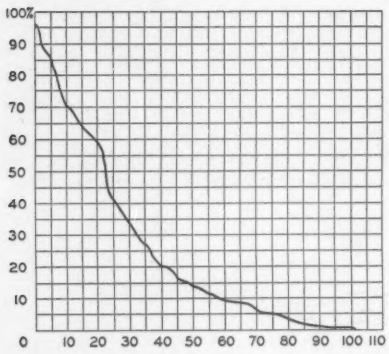

Fig. 34. Graph showing relative frequency of occurrence of the 101 species of birds recorded in Alum Rock Park, California.

In the list which follows, the per cent of frequency was determined for each bird by dividing the number of days that bird was recorded by the whole number of trips to the area. This simple procedure reduces an unwieldy set of numbers to one

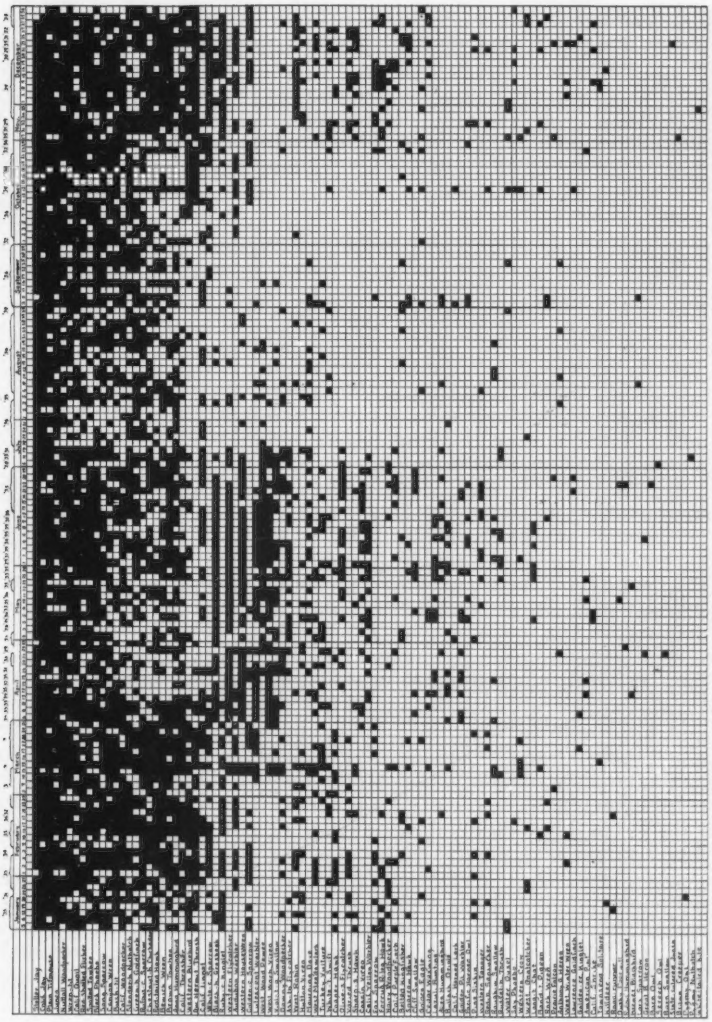

Fig. 35. Chart showing days (marked in black) on which each species was recorded in Alum Rock Park, California.

that gives good basis for comparison of the species not only in this list but with similar rankings in other localities. (See figs. 34 and 35.)

List of species recorded from Alum Rock Park, arranged in order of abundance, with per cent of frequency for each.

		per cent
1	Steller Jay	96
2	California Jay	91.5
3	Plain Titmouse	87
4	Oregon Junco	85
5	Nuttall Woodpecker	78.5
6	Wren-tit	78
7	California Quail	76.5
8	Red-shafted Flicker	74
9	Spotted Towhee	70.5
10	Black Phoebe	70
11	Song Sparrow	70
12	Canyon Wren	68
13	Bush-tit	67.5
14	California Woodpecker	64
15	White-breasted Nuthatch	64
16	Green-backed Goldfinch	62
17	Rufous-crowned Sparrow	61.5
18	Chestnut-backed Chickadee	61
19	Red-tailed Hawk	60
20	Bewick Wren	59.5
21	Brown Towhee	59.5
22	Anna Hummingbird	59
23	California Thrasher	54.5
24	Western Bluebird	46.5
25	Hermit Thrush	41.5
26	Linnet	40.5
27	White-crowned Sparrow	36.5
28	Black-headed Grosbeak	35
29	Ruby-crowned Kinglet	34
30	Western Flycatcher	33.5
31	Audubon Warbler	31
32	House Wren	30.5
33	Golden-crowned Sparrow	29.5
34	Orange-crowned Warbler	27.5
35	Wood Pewee	27
36	Warbling Vireo	27
37	Violet-green Swallow	23
38	Downy Woodpecker	21
39	Ash-throated Flycatcher	21
40	Robin	19.5
41	Hutton Vireo	19.5
42	Mourning Dove	19
43	Western Meadowlark	19
44	Turkey Vulture	18
45	White-throated Swift	16
46	Cooper Hawk	15
47	Olive-sided Flycatcher	15
48	Varied Thrush	15
49	Sharp-shinned Hawk	14
50	Cassin Vireo	14
51	Yellow Warbler	14
52	Fox Sparrow	14
53	Ferruginous Rough-leg	12
54	Hairy Woodpecker	12
55	Purple Finch	12
56	Belted Kingfisher	11.5
57	Sparrow Hawk	11
58	Cliff Swallow	11
59	Golden Eagle	9.5
60	Cedar Waxwing	9.5
61	Lazuli Bunting	9.5
62	Allen Hummingbird	8.5
63	Bullock Oriole	8.5
64	Horned Lark	8
65	Pileolated Warbler	8
66	Great Horned Owl	7.5
67	Pine Siskin	7.5
68	Western Tanager	7.5
69	Red-breasted Sapsucker	6.5
70	Rough-winged Swallow	6.5
71	Russet-backed Thrush	6
72	Dipper	6
73	Say Phoebe	5
74	Crow	5
75	Western Gnatcatcher	5
76	Yellow-breasted Chat	5
77	Band-tailed Pigeon	4.5
78	Rock Wren	4.5
79	Prairie Falcon	4.5
80	Green Heron	3.5
81	Winter Wren	3.5
82	Lawrence Goldfinch	3.5
83	Golden-crowned Kinglet	3
84	Pipit	2
85	Loggerhead Shrike	2
86	Townsend Solitaire	2
87	Killdeer	1.5
88	Road-runner	1.5
89	Poor-will	1.5
90	Rufous Hummingbird	1.5
91	Brewer Blackbird	1.5
92	Lark Sparrow	1.5
93	Great Blue Heron	.7
94	Barn Owl	.7
95	Screech Owl	.7
96	Barn Swallow	.7
97	Slate-colored Junco	.7
98	Brown Creeper	.7
99	Pigmy Owl	.7
100	Pigmy Nuthatch	.7
101	White-tailed Kite	.7

When the species listed above are assigned to five classes of frequency (A, 1-20 per cent; B, 21-40 per cent; C, 41-60 per cent; D, 61-80 per cent; E, 81-100

per cent), the numbers of species in these classes are 62, 14, 7, 14, and 4, respectively, and these figures also represent the percentage of species in each group in the whole list recorded for the area. Thus the distribution of species among the classes of frequency is remarkably like that revealed in similar surveys of other localities. The only perceptible difference is in classes D and E. The small number of species in class E may result, we suspect, from the circumstance that the thick screen of the predominantly brushy habitat in Alum Rock Park hinders the detection of every species on each trip. Because the present use of the records was not anticipated, the observers may not have made special effort to record all the common species noted. Despite this possible lack in materials, the species appear generally to be arranged in the proper sequence, and the index numbers are useful aids in judging the place of each bird in the fauna.

Museum of Vertebrate Zoology, University of California, Berkeley, January 21, 1937.

A JAY SHOOT IN CALIFORNIA

By MARY M. ERICKSON

The killing of vermin believed to be destructive to game is common practice among sportsmen, but the result of a campaign for this purpose has rarely been recorded. As an outgrowth of a request for information on the inter-relationships of jays and quail, Mr. E. T. Hooper and I were given the opportunity to witness a jay shoot held by the Associated Sportsmen of Calaveras County, California, on Sunday, April 26, 1936.

The sportsmen in this region are interested in upland game birds, particularly the California Quail, and they seek to maintain this species in sufficient numbers to make good hunting. Their reason for holding a jay shoot, reduced to its simplest terms, is that jays have been seen to kill young quail and are known to destroy eggs, and therefore, the argument goes, any decrease in the number of jays must benefit the quail. This opinion was not unanimous. Some hunters expected real benefit to the quail to result from the shoot; a few were skeptical, but they felt that the quail should be given the benefit of the doubt.

Jay shoots have been held in Calaveras County for many years. Two persons reported that hunts have taken place about once a year during the eleven and fourteen years they had lived in the vicinity. Two old-time residents said that occasional shoots had been held thirty or forty years previously. Recently, one or two shoots a year have been held, usually in the fall, sometimes in the spring, but the time of year and the number are irregular. The last shoot had been held on October 20, 1935, when, according to a local newspaper, 1368 jays were killed.

The shoots, at least in recent years, have been conducted as contests between two teams, and after the count there has been a dinner, or as this year, a barbecue in which wives and friends shared, at the expense of the losing side.

Previous to the 1936 shoot, two captains, one from San Andreas and one from Angels Camp, each selected a team from among the men planning to participate. Contrary to previous practice, the personnel of the teams this year was kept secret until the time of the count.

On the day of the shoot each participant was free to hunt when and where he liked until 4:30 p.m., when the count was to be started. As would be expected, certain enthusiasts started at daybreak and hunted until the time set for checking in. At

the other extreme a few came in with one or two jays taken incidentally in the course of other activities. The majority made the most of the chance to be out in the hills, but hunted only part of the day. By five o'clock the teams had gathered for the barbecue, and the count began. Mr. Hooper, a non-partisan, was asked to count the birds, while a member called the count and recorded each man's total on a score card. Men with gunny sacks, hunting coats, or whatever held their bags clustered around these two, and one after another dumped his birds on the ground until the last one had been checked.

All told, thirty-four men took part in the shoot. The teams as originally listed had 27 men on a side, but a number of these did not hunt, while some who were not listed brought in jays.

In scoring, each jay, whether Steller (*Cyanocitta stelleri frontalis*) or California (*Aphelocoma californica immanis*), counted one point, and each hawk, regardless of species, three points. Several men remarked that feral house cats should have counted from 5 to 25 points each, but the suggestion was not adopted. A horned owl and a shrike were not counted. A number of men said that "brush robins" (brown towhees), woodpeckers, and flickers were occasionally shot for jays, but these were not brought in.

Three hundred and ninety-eight (398) California Jays, 214 Steller Jays, 1 Red-tailed Hawk, 1 Cooper Hawk, and 3 Sparrow Hawks were brought in, making a total of 627 points. The highest individual score was 76, made on a game refuge south of San Andreas. The lowest score was 1, and the average was about 30 points. As the count progressed, one side was obviously well in the lead, and thereafter little interest was shown in the score. Some of the group seemed disappointed in the number of jays killed; they felt that the shoot had been held too late in the year. They believed that the jays were abundant in March, and that more would have been killed at that time. One hunter thought that the scarcity resulted from the movement of the jays out of the region. Actually, this may have been true in the case of the Steller Jay, but with the California Jay the scarcity was probably apparent rather than real, and it may have resulted from a change in behavior at the beginning of the nesting season.

As soon as the count was finished, the barbecue began. A quarter of beef and two lambs, which had been cooking during the day, were served with a picnic meal of beans, salad, coffee, and relishes. Beer kegs had been broached at the ranch during the afternoon, and a guitar, accordion, and group singing added to the spirit of the gathering, which broke up reluctantly with nightfall.

Figures as to the approximate amount of ammunition used in the shoot and its cost were secured through the store which handled the shells for the San Andreas group. Here, twenty-one men bought 58 boxes of shells at a total cost of $35. (It is my understanding that a special price was made to the organization.) If each of the twelve men from Angels Camp purchased an equivalent amount, 33 more boxes were purchased, to make a total of 91 at an approximate cost of $55, or an average cost of 9 cents for each bird killed. Some of these shells may not have been used, but this discount was undoubtedly compensated for to some extent by the use of such shells as were already on hand. If the equivalent of the ammunition sold was used, the men averaged 69 rounds apiece, and they used an average of 3.7 shells for each bird killed. The guns, with the exception of one 20 gauge, were about evenly divided between 12 and 16 gauge. The shells were loaded with number 7½ or 8 shot.

The area covered by the shoot can only be estimated. Most if not all of the hunting took place within the digger pine and blue oak belt which stretches 4 to 5

miles northeast and about 10 miles southwest of San Andreas and Angels Camp. In this belt, a section was covered from 7 to 8 miles northwest of San Andreas and 5 to 6 miles southeast of Angels Camp. This amounts to a rectangle of foothill country some 25 by 15 miles in extent, or covering some 375 square miles (U. S. G. S., Jackson, Big Trees, Copperopolis, and Sonora quadrangles). The actual ground covered was naturally much less. Some effort was made to get hunters to concentrate on the game reserves (closed ranches) in the region, but for the most part the men went where they thought the jays were most abundant. The activity probably centered around San Andreas and Angels Camp within a total area of 200 square miles, but even this does not mean that such an area was covered with systematic thoroughness.

An estimate of the number of jays in this area can be little more than speculation, but it will be suggestive. On the day before the shoot, fifteen hours were spent by Mr. Hooper and me in taking a census in three sample areas of typical jay habitat, and every effort was made to get an accurate count. On this meager basis, the jay population is estimated as one jay, either California or Steller, for every 5½ acres of suitable habitat, or 118 jays per square mile of such habitat.

In the Berkeley Hills, during the winter and spring of 1935-36, two pairs of California Jays lived in a small canyon somewhat less than 8 acres in extent, or on an average of 2 acres for each jay. In another canyon, near Berkeley, containing about 20 acres, there were two breeding pairs in 1932, or one jay for every five apparently suitable acres. These both represent minimum numbers, for they include only the breeding California jays, and do not include the Steller Jays which were also present.

In comparison with these figures, an estimate for Calaveras County of one jay for every 5½ acres, in an area of equally good or better habitat, does not seem excessive. Assuming that only half of the total area is suitable for occupancy by jays, the jay population of the 200 square miles in which the hunting was most concentrated, would be 11,636. On this basis, the shooting of 612 jays resulted in the destruction of about 5 per cent of the jay population.

Since the shoot took place at the beginning of the nesting season, whatever reduction occurred had a maximum effect, for it cut into the breeding population. Nonetheless, a reduction of 5 per cent, even if of annual occurrence, would probably have little effect upon the year-to-year population of jays. By the end of the breeding season, the population is doubled in wren-tits (Erickson, MS), and nearly tripled in quail (Sumner, Calif. Fish and Game, vol. 21, 1935, pp. 165-342). Similar figures are not available for the jays, but normal broods and a probable increased survival resulting from less competition should quickly compensate for the relatively small reduction. The shoot held in the fall of 1935 when the population was near its maximum, probably did not eliminate more than 5 per cent of the next breeding population, even though twice as many were killed, for part of the kill was composed of birds which in time would have been destroyed by natural forces.

If, as is generally believed, the toll levied by natural forces automatically decreases as the surplus is removed, the number of individuals surviving to the following breeding season would not have been altered perceptibly by either shoot. Furthermore, if the young-of-the-year show the same tendency to disperse as certain other species, such as the wren-tit, do, the kill would have had no local effect whatever, but would have served to reduce only faintly the numbers of emigrants to more or less distant regions. In other words, nothing less than a sweep of the surrounding country on a quite impracticable, large scale could have an effect on the population of a given central area. Long before this comparatively slow process could operate, however,

whatever reduction in numbers had occurred as a result of the shoot, probably would be lost. At least two instances in which jays quickly filled an emptied area have been recorded (Grinnell and Storer, Animal Life in the Yosemite, 1924, pp. 385-386; Sumner, *op. cit.*, p. 323).

This conclusion is substantiated by the fact that we obtained no specific evidence that the shoots have ever noticeably decreased the number of jays. To be sure, most accounts of previous shoots included statements to the effect that in former days the shoots resulted in larger kills, 2000 to 2500 rather than 600 to 700; but the number killed in the shoot six months ago, in the fall of 1935, was variously reported as from five or six hundred to two thousand, and the tendency of a story to grow with age and repetition is proverbial. One man stated that the number killed in recent years was smaller, but he believed this was because of lack of interest on the part of those participating rather than to any change in the number of jays. At least two men stated that there was no appreciable decrease even immediately following a shoot.

The interrelationships of the jays and quail have occasioned much controversy for many years. Conversation with different individuals of the Calaveras County community brought forth the usual arguments. Almost everybody had seen jays kill young quail or had come upon a jay just after such an incident. One person told of seeing a jay catch a young quail that had been flushed by his car. He saw the jay open the head and eat the brain of the quail. Most witnesses stated that the jays regularly eat the brain and leave the carcass. In view of the care with which jays bury all surplus food, I am inclined to think that if not interrupted they would probably use all the carcass or bury what was not eaten at the moment. I have one record of a jay which I frightened away from the remains of a wren-tit nestling, but which returned for it when I withdrew.

Jays were generally reported to eat eggs. In most instances, they had been seen to rob chicken houses. One man had seen a quail's nest destroyed. At least one man felt that, though the jay kills some young quail, it does more good than harm because its alarm notes on sighting a hawk warn the quail of the danger. We had little opportunity to gather direct evidence on this question. Sumner considers all these aspects, and, on the basis of his study of quail, concludes that the effect of the jay on the numbers of the quail is negligible.

Other enemies of quail besides the jay were recognized by the vermin hunters. One of these is the house cat which all reported as numerous and destructive. Such animals, which abound in a feral or semi-feral state, are shot on sight. Most of these are, of course, local animals "run wild;" but one man told of a neighbor that had chanced on a party from Stockton, about to release three gunny sacks full of cats on his place, and this method of benefiting one neighborhood at the expense of another was common.

Hawks, since they were included in the shoot, were obviously considered as enemies, but opinions varied as to which kinds were destructive. Several men, when looking at the Cooper Hawk, remarked that it was the kind that could work havoc in a covey of quail. At least, some men in the group knew that the red-tail was protected by law, and one man reported the finding of a nest of downy young red-tails which he had left undisturbed. Several men expressed a desire to know something of the food habits of the Red-tailed Hawk and the Sparrow Hawk. The exclusion of the Horned Owl from the scoring was unexpected. Two conflicting stories were told, of its value as a rodent killer and of its harmfulness as a chicken thief, but no definite evidence on its relation to quail was brought forward.

Weather conditions were discussed as affecting the number of quail. The recent years of drought and the reduction of the water supply were said to have affected the survival of both young and adults, and the late rains of the preceding year were believed to have soaked some of the eggs and reduced the hatch.

Man, in one way or another, was implicated as an important agent affecting the number of quail. Generally emphasized was the use of poisoned grain against ground squirrels. The kind of poison used was not definitely known. One of the men said that after poisoned grain had been put out, he had found numbers of quail, rabbits, and even deer dead in fields or along the margins of areas kept green by springs. He thought the squirrels should be controlled, but he felt that a squirrel shoot, on the order of a jay shoot, would be good fun, would be as effective in reducing the squirrels as poisoned grain, and would operate only against the animal which they wished to kill.

Illegal practices such as spotlighting and bootlegging game were mentioned, but the present game warden is believed to be successfully eliminating these practices. The increase in the number of hunters on account of good roads and cars seems to be a problem without a solution. One non-hunter believed that if the sportsmen were better "sports," the quail would have a chance, since most of the hunters regularly shot until they got the bag limit, whether they could make use of the birds or not.

Besides attempting to protect the quail already present, the local hunters are trying to increase their number by the establishment of areas closed to shooting, by keeping water holes available, by feeding, and by rearing and planting young stock. The latter has been accompanied by the release of the Hungarian Partridge and the Wild Turkey, neither of which has become established. Hopes were expressed that the Chukar Partridge could be planted when stock is available.

Whatever the relation of the jays and quail, the shoot described would likely at best bring only an imperceptible reduction in the numbers of jays. Vermin shoots persist partly because the enmity of the sportsman is inflamed by seeing jays kill young quail, partly because, like the husking bee or barn raising, they constitute a pleasant aspect of rural society.

Museum of Vertebrate Zoology, University of California, Berkeley, November 27, 1936.

WATER BIRDS OF THE BOULDER DAM REGION

WITH MAP

By DWIGHT C. SMILEY

At intervals from January 20 to June 30, 1936, I made wildlife studies for the National Park Service in the vicinity of Lake Mead—the reservoir of Boulder Dam. The Colorado River drains the western slope of the central Rocky Mountains. It flows westward through the Grand Canyon of northern Arizona, and then it turns abruptly southward. In its southward flow to the Gulf of California, it forms a boundary which separates Arizona from southern Nevada and from southern California. Boulder Dam is situated ten miles south of the west-to-south turning point of the river.

Late in the winter of 1935, the flow of the Colorado was first checked by Boulder Dam, and Lake Mead reservoir began to fill. The latter is now a Y-shaped body of water; two arms of the "Y" are formed by the valley of the Colorado, and

the third by the valley of the Virgin River. (See map, fig. 36.) In the spring flood of 1939, Lake Mead is expected to reach its mean high level. Maximum elevation of surface will be 1229 feet above sea level; maximum depth, 589 feet; maximum length, 115 miles; maximum width, 8 miles; surface area, 227 square miles.

The adaptability of Lake Mead as a bird habitat is conditioned by the physical character of this part of the Colorado River valley. When viewed from some high point, the valley appears, because of the lack of conspicuous vegetation, like a massive relief map formed from vari-colored plaster. The lake is extending 20 miles into the terminal part of Grand Canyon. From the end of Grand Canyon to Boulder Dam, a distance of 80 miles, five narrow, cliff-sided canyons cut through as many mountain ranges. The Virgin River arm of the lake is forming in a broad, V-shaped valley; at the upper, free apices of the "V," mountains parallel the ribbon-like valley floor.

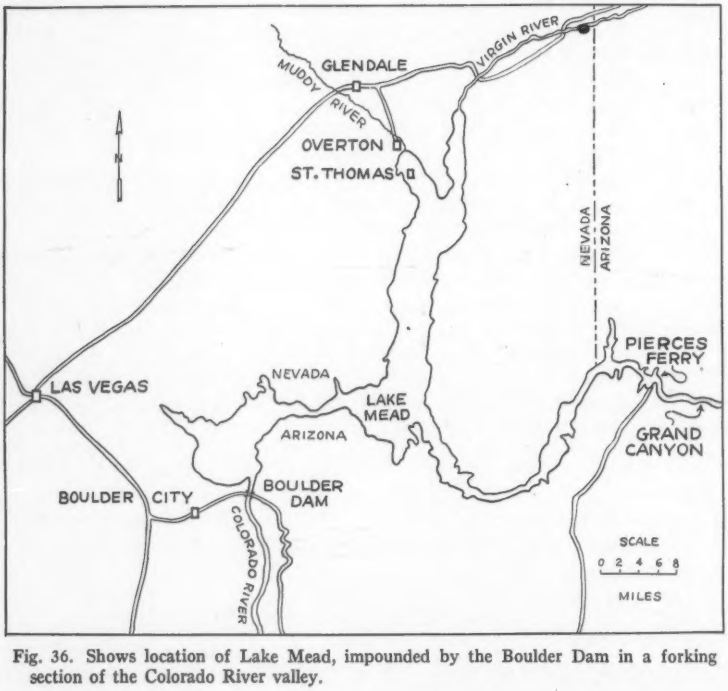

Fig. 36. Shows location of Lake Mead, impounded by the Boulder Dam in a forking section of the Colorado River valley.

As to the effect on bird life resulting from the formation of this lake and from its eventual destruction as such, it is safe to make one general statement. The opaque water of the Colorado and of the Virgin carries enough sediment into the lake to obliterate it in less than two hundred years. The submerged deltas forming at the mouths of the two rivers point to the future abundance of waders and shore birds. The rapid destruction of this lake may be prevented by the construction of another dam upstream on the Colorado; the reservoir thus created would for a further period of time catch the sediment.

Of factors inducing change in status of birds here, the submersion of habitats is of major importance. The flats at the mouth of the Virgin River have been submerged. The birds which occurred there must find other places for foraging and resting. Some of them may increase and others decrease under the new conditions. My notebook account contains no record of ducks seen "tipping-up" for food in shallow water. Conditions during the formative stage of the lake are unfavorable to birds of this foraging habit. Aquatic organisms sought by these birds do not become established in the temporary shallows of the lake.

When the lake reaches its mean high level, conditions will be as unfavorable as at present for shallow-water-feeding birds. The level of the lake will fluctuate usually about 60 feet each year, on account of the annual floods of the two tributary rivers. This belt of shore between low- and high-water marks will be subjected alternately to desert climate and to submersion by water. Therefore neither aquatic nor terrestrial food organisms can become established. An exception to this situation, perhaps, will occur on the adobe clay flats at the mouth of the Muddy River. Judging from the semi-aquatic tendency of cockleburs (*Xanthium* sp.) in this locality, these may grow in abundance over the alternately submerged and exposed adobe flats. The only evidence that ducks may possibly eat either the plant or the seed of cockleburs was found in the listing of it by Wetmore as one of several plants "available as duck foods" in the Bear River marshes, Utah (U. S. Dept. Agric. Bull. No. 936, 1921, p. 13). Cattails (*Typha* sp.) important in southern Nevada as "cover" for ducks probably will not grow along the shore of the lake.

The status of surface-feeding ducks may hinge upon one factor—a slight tendency to the development of barely submerged algae on Lake Mead. The amount and kind of animal food in these algae may determine the abundance of surface-feeding birds.

The transparent clearness of the water of Lake Mead and of the river downstream from the dam, is one of the most significant factors evoking response by birds of the area. Although this affects all aquatic birds in more or less degree, the greatest change may be induced in fish-eating species. The clear water no doubt facilitates the capture of fish. It is evident that the increased availability of prey, in addition to a quantitatively expanded foraging area (Lake Mead), should be favorable to avian fish-eaters.

Three species of migratory fish-eating birds were recorded by me on Lake Mead. The most abundant species seen was the Double-crested Cormorant (*Phalacrocorax auritus*). On April 15, 65 (the numbers in each of the 4 flocks were 45, 2, 8, and 10) were observed during an 80-mile boat trip from Boulder Dam to Pierce's Ferry. Twice, I saw White Pelicans (*Pelecanus erythrorhynchos*). On April 15, a single individual floated idly on the lake 50 feet from the Nevada shore; the locality was near the former place of convergence of the Colorado and Virgin rivers. On May 31, five pelicans circled in a line over the newly-formed shallows of the lake, 12 miles south of Saint Thomas.

As to the American Merganser (*Mergus merganser*), on April 15, I noted a flock of thirteen flying not far east of the former point of convergence of the Colorado and Virgin rivers. The presence of this species on the clear water of the Colorado below the dam suggests a major effect that this structure is having on aquatic bird life. The water released at the outlet valves is clear and has a relatively constant flow—a contrast with the former seasonal floods. Both the clearness and the relative constancy of flow should allow this part of the river to support a more stable organic community than was formerly present. Conditions should be favorable to

the establishment of aquatic and semi-aquatic vegetation with consequent conditions favorable to fishes and to fish-eating birds as well as to predominantly vegetarian ducks.

Three female American Mergansers were seen on February 21 as they foraged on the river, one-half mile downstream from the dam. For a time each strained the surface of the water with side to side movements of the half-submerged bill. Simultaneously two of them detected the proximity of a fish and dived. With amazing speed they pursued the quarry along a circuitous course. In less than a minute one came to the surface with a fish in its bill.

The only resident fish-eating bird of which I have record is the Great Blue Heron (*Ardea herodias*), the abundance of which in the vicinity of Lake Mead, on April 15, is indicated by a count of 14 between Boulder Dam and Pierce's Ferry, a distance of 80 miles.

It is doubtful that herons were previously as abundant along this section of the Colorado River as they now are. There is reason to believe, however, that the species may have been present; this is tenable as a presumption in spite of the fact that the opacity of the Colorado River precludes the possibility of a heron sighting fish that are entirely submerged. The presence of herons along the California-Arizona section of the Colorado has been explained by the fact that these birds are able to obtain fish in the relatively clear water of overflow ponds situated on the flats extending back from the edge of the river. Because the steep-sloping, or canyon-like banks of the Colorado River in the Lake Mead area are unfavorable to the formation of overflow ponds, it is necessary to invoke a different explanation of the assumed pre-Boulder Dam presence of herons along this more northerly section of the Colorado.

That herons may have been able to obtain fish directly from this sediment-laden stream was rendered possible by a reaction to excessively muddy water, of carp (*Cyprinus carpio*), now a common species of fish in the Colorado. In Iowa, several years ago, I observed this reaction by wading into a knee-deep pond in a manner so vigorous as to stir up heavy clouds of sediment. Coincident with the moment of the greatest mud-cloudiness of the water, the dorsal fins of carp were seen ripping through the surface of the water. Perhaps these fish sought the upper stratum of water where there was less mud than at the bottom. In like manner carp may seek the peripheral quiet water eddies of the Colorado. Under such circumstances any carp so unwary as to allow its dorsal fin to protrude above the water would subject itself to capture by a heron.

As a working hypothesis it may be considered that any fish-eating birds which have been reported from the interior of southwestern United States, eventually might visit Mead Lake to catch fish. Consequently, I sought for distributional information concerning, and attempted to get sight records of, the Bald Eagle (*Haliaeetus leucocephalus*) and the Osprey (*Pandion haliaëtus*).

The Bald Eagle may become a resident close by the lake. Van Rossem (Pac. Coast Avif. No. 24, 1936, p. 21) reported it from approximately 50 miles west of Boulder Dam. Mr. Frank Waite, of Las Vegas, reported that about 1924 an injured Bald Eagle was found 15 miles west of the site of the lake.

There is even more reason to believe that the Osprey will become resident near Lake Mead. Grinnell (Univ. Calif. Publ. Zool., vol. 12, 1914, p. 127) observed two Ospreys on the California-Arizona section of the Colorado River. Linsdale (Pac. Coast Avif. No. 23, 1936, p. 45) reported several seen in 1891 by members of the Death Valley Expedition at Pahranagat Lake. This lake is fifty miles north-northwest

of Lake Mead. On May 11, I saw an Osprey as it preened on a high, somewhat horizontal dead branch of a cottonwood tree; the bird was seen at a point on the future northern shore line of Lake Mead, three miles south of Overton.

Census counts of aquatic birds were taken on every possible occasion in two localities: Lake Mead and Kaolin Lake—the latter a 40-acre reservoir 3 miles south of Overton. The following table represents seven bird counts.

	Lake Mead			Kaolin Reservoir			
	Mar.		Apr.	Mar.	Apr.		May
	3	5	15	13	9	7	14
White Pelican (*Pelecanus erythrorhynchos*)			1				
Double-crested Cormorant (*Phalacrocorax auritus*)			65				
Great Blue Heron (*Ardea herodias*)	3		14			1	
Black-crowned Night Heron (*Nycticorax nycticorax*)						3	
Mallard (*Anas platyrhynchos*)	6						
Baldpate (*Mareca americana*)		5			21		
Pintail (*Dafila acuta*)	60			6	4	1	
Cinnamon Teal (*Querquedula cyanoptera*)				4		2	2
Shoveller (*Spatula clypeata*)				8	29		
Ring-necked Duck (*Nyroca collaris*)						1	1
Bufflehead (*Charitonetta albeola*)					4		
Ruddy Duck (*Erismatura jamaicensis*)				6	20	2	4
American Merganser (*Mergus merganser*)			9				
American Coot (*Fulica americana*)	2		1	10	55	2	25
Killdeer (*Oxyechus vociferus*)	1			2		1	5
Spotted Sandpiper (*Actitis macularia*)						4	
Avocet (*Recurvirostra americana*)					14		
Black-necked Stilt (*Himantopus mexicanus*)					12		6
Wilson Phalarope (*Steganopus tricolor*)						4	
Gull (*Larus* sp.)	12		8				
Black Tern (*Chlidonias nigra*)							1
Belted Kingfisher (*Megaceryle alcyon*)	1						

I wish to thank staff members of the Museum of Vertebrate Zoology for suggestions during the preparation of this discussion.

Berkeley, California, February 17, 1937.

A COMPARISON OF BEHAVIOR OF CERTAIN NORTH AMERICAN AND EUROPEAN SHRIKES

By ALDEN H. MILLER

An article by Theo. Schreurs, appearing in the last volume of the Journal für Ornithologie (vol. 84, 1936, pp. 442-470), gives an account of the natural history of two Old World shrikes, the Red-backed Shrike (*Lanius collurio*) and the Woodchat Shrike (*Lanius senator*). It is well known that there are certain instincts common to different kinds of shrikes, most spectacular of which is the impaling instinct. Schreurs' paper affords a convenient assemblage of facts, especially about *L. collurio*, which seem worth comparing with information which I have gathered pertaining to the Loggerhead Shrike (*Lanius ludovicianus*) of North America (see Univ. Calif. Publ. Zool., vol. 38, 1931, pp. 11-242). That Schreurs has interpreted action in many instances in accordance with my own views is especially significant because his con-

clusions were drawn independently, apparently without reference to any literature on American species.

Although the impaling instinct is the principal subject of Schreurs' study, much significant information along other lines also is presented. The Red-backed and Woodchat shrikes hold breeding territories comparable to those of the Loggerhead. The migration of these European species precludes their holding territories throughout the year as is done by many resident shrikes of California. The sizes of breeding territories (roughly translated into acres) are in both *collurio* and *senator* 4 to 8 acres. In the Loggerhead they are 11 to 15 acres, in desert areas 13 to 40 acres. It would appear that the smaller territories of *collurio* and *senator* consist of less open terrain than those of *ludovicianus;* such a correlation also exists within the latter species.

Vegetation in regions so remote as California and western Germany hardly can be compared in detail. But the following general aspects of the breeding territories are strikingly similar: open areas with lookout posts around them; frequent, if not invariable, presence of roadways or streets, the surfaces of which are hunted for insects; some form of scattered bushes or trees, but no solid stands of timber; *senator* avoids large tracts of bushes, and in this respect it is like *ludovicianus,* whereas *collurio* tolerates more cover; special perches, lookouts or headquarters at which droppings, insect wings and pellets accumulate and at which a majority of the daylight hours is spent.

Territories are the same from year to year. If in *collurio* a nest is destroyed, the pair moves to a new place near by. In *ludovicianus* this definitely is not so; pairs regularly nest again in the same territory, although often not in the same bush or tree.

Nests of all three species tend to be well concealed and they are placed at heights of 2 to 25 feet. Those of *collurio* average somewhat lower (4 to 6 feet) than those of *ludovicianus* and *senator.* A preference for woolly materials for the nest is shown by all, but *collurio* does not use these materials in the lining as does *ludovicianus;* the linings of *collurio* nests consist of small rootlets.

Schreurs found the number of eggs to be either 5 or 6. Sets of 7 and 8 are reported by other observers. For *Lanius ludovicianus gambeli* sets of 5 and 6 are normal, and those of 4, 7, and 8 are uncommon. Only in the Lower California shrikes, among North American forms, is the number known to be significantly smaller, usually only 3 or 4. With respect to nest regime, many traits are common to Old and New World species: only the female incubates; the female is fed frequently by the male while she is on the nest, or she may leave the nest to meet the male when he is bringing food; no parasitism by cuckoos or cowbirds, as the case may be, is tolerated; the nest often is vigorously protected, but there is much individual variation in the boldness of the defense.

Much, if not all, of the song of *collurio* Schreurs ascribes to mimicry. Similar interpretation frequently has been placed upon the songs of *ludovicianus,* but careful study of the continuous, primitive song of *ludovicianus,* the type of song most likely to be called an imitation, has convinced me that there is no true mimicry. Schreurs' descriptions suggest that the song pattern of *collurio* in general is similar to the primitive song of *ludovicianus.* It would be presumptuous for one unacquainted with *collurio* in the field to disclaim mimicry in this species, yet I suspect the statement that the Red-backed Shrike's song is mimicry, exclusively, is exaggerated. Any primitive song that is not of stereotyped pattern will contain trills and phrases remindful of the notes of other birds.

The period from the date of the first egg until the young leave the nest is 31

days in *collurio*, 41 days in *ludovicianus*. Young of the latter species occasionally leave the nest in less than 21 days, which is the time I estimate to be the average nestling life, but even so, incubation and raising of the young are accomplished in a distinctly shorter time in the smaller species, *collurio*.

A number of foraging habits are held in common: The prey usually is sighted from a distance on a roadway or piece of open ground, and the bird glides down to seize it; shrikes are not averse to foraging in a light rain; heavy prey, like a large mouse, may be carried in the bill, otherwise in the feet; the most available prey, with respect both to abundance and to ease of capture, make up most of the diet at any given period; food of different pairs is noticeably variable in accordance with facilities in their own territories and with the needs of their young; rodents are killed by a simple bite in the neck or back of the head.

Many types of thorns are used in impaling. *Collurio* prefers partly concealed locations in bushes. *Senator* and *ludovicianus* commonly impale in more open situations, both using barbed wire extensively. Schreurs presents little evidence of impaling on sharp twigs and in crotches, not uncommon practices in *ludovicianus*.

Agreement in interpreting the meaning of the impaling instinct is found in the idea, long ago expressed by Seebohm, that the feet of shrikes are ineffective in holding prey. The impaling is a means of holding large prey while it is being torn to pieces. Although Schreurs refers to impaling as storage, it is clear that there is no more storage practiced by the European species than there is by *ludovicianus*. Food merely is left hanging when a shrike is sated, and usually the edible parts are eaten at successive feedings. Impalings as a rule are eaten within 24 hours after capture. Only in this restricted sense is there storage; it is not like the storing activities of certain rodents.

Schreurs gives a number of reasons for the occurrence of deserted impalings. Briefly, these are: (1) Subsequent death or injury to the shrike that impaled the prey; (2) destruction of the nest so that the cycle of instincts is upset and the routine of returning to the prey is interfered with; (3) sudden departure of a brood of young from the vicinity of the nest and from the impaling; (4) lack of fixity in territory shortly after arrival in the spring; (5) disturbance by other shrikes along territorial boundaries, or in a foreign territory, when prey has been captured and is being butchered. These factors might well apply to any species of shrike of similar impaling habits. To these I would add that prey may be left because it becomes spoiled or dry. Also parts of animals, or even entire animals of certain kinds, are less desirable, and if more preferable prey can be obtained, these poorer kinds of food may be deserted. Supporting this idea is Schreurs' observation that skin and jaws of mice often are left on the thorns; I have presented comparable evidence.

In striking parallel, all three species have been found to leave prey more often when the pressure for food for nestlings or for a brooding female is lacking. The shrike cleans up the scraps in his butcher shop less carefully when there is plenty for himself and dependents.

Still to be explained is the action of shrikes that kill and impale without eating any part of their prey. Schreurs suggests this problem in his questioning of the meaning of a shrike's killing an insect one minute and leaving it impaled, while a minute later it captures and eats another insect of the same kind. I again resort to the explanation offered earlier that the bird at such a time is not especially hungry. The instinct to pursue and capture is strong and always is present. Only when the prey is captured is the internal stimulus too weak to complete the chain of instincts in the swallowing act. The shrike, rather than drop an insect in which there is only casual interest, places it on a thorn; this is the most natural way of getting rid of it for

the moment. There is little merit in the idea that impalings serve to attract other animals or that they become more "tasty" by hanging. That a shrike's inability to eat is caused by a pellet that is ready for ejection, may be, as I have learned from caged birds, a reason for impaling without immediate feeding.

Shrikes prefer to pull small bites from impaled prey. The same thorns to which they have become accustomed are used repeatedly, but, in the course of handling a large object, the position of the prey may be changed and different thorns used. Prey is impaled through various parts of the body, but heads of birds and mammals often are removed and impaled separately; commonly they are eaten first. Schreurs found that *collurio* will impale insects so that they remain alive on the thorn. *Ludovicianus* may do this, but he claims that *senator* always kills an insect. Interesting is the attempted defense of impalings by *collurio* when a human approaches. Little of this is noted in *ludovicianus* and *senator,* but in captive Loggerheads it is pronounced. Probably in the wild the shyness of these two species overcomes the urge to defend.

Schreurs' statement that the impaling instinct is in operation throughout the year is fully borne out by observations upon permanently resident shrikes both in America and in the Old World. The instinct may be an important element of the breeding cycle, but it must be remembered that it develops independently of this and makes its appearance in young captive birds that have been separated from their parents at an early age. It is vital to the existence of the shrike at all seasons.

The significance of similarities in behavior pattern in distinct species of the same genus lies in the strong evidence they afford for common descent and for adaptation to similar modes of life. The characteristics of shrike behavior are as constant and as obvious as many structural features that relate the three species of *Lanius* under consideration. The inherited behavior is no less conservative in evolution than the structure. The differences between the species consist of relatively small modifications of the behavior pattern. Tolerance of dense floral habitat, degree of aggressiveness, and concealment of impalings are items typical of specific differentiation; they might all be termed "quantitative" differences. Probably there is more dissimilarity in voice, in temperament and in details of movements than has thus far been brought out. In final analysis, the more prominent features of behavior ascertained through a study of natural history prove to be generic or even of family significance.

Museum of Vertebrate Zoology, Berkeley, California, February 5, 1937.

SUBSPECIFIC APPRAISAL OF RED-BREASTED SAPSUCKERS

By JOSEPH GRINNELL

Ideas and pertinent materials have accumulated slowly until they have reached a stage which seems to warrant my offering some statements concerning the racial status of some of the birds resident in extreme northwestern California. It will be recalled that this part of the State includes a segment of the "northwest humid coast strip" of North America, and that in this strip many birds are represented by strongly marked subspecies—some forms even being of full specific rating. Furthermore, as is well known, within the full length of this strip, which roughly extends from Prince William Sound, Alaska, to Monterey Bay, California, there is further differentiation of some of the humid-coast forms into minor races, less pronounced but nomenclaturally recognizable. Thus, of the Chestnut-backed Chickadee there are four races, of the Hermit Thrush at least three races, of the Steller Jay four races.

It happens that the northern boundary of California cuts to the seacoast through the humid-coast strip in somewhat intermediate position between the more strongly developed differentiation centers at the south (in central California) and to the northward (Olympic Peninsula and Puget Sound region), with the result that specimens of certain birds taken in California, and doubtless also in Oregon, in the counties adjacent to the inter-state boundary, are with difficulty placed under one subspecific name (of a race to the south) or another (of a race to the north). This raises the whole moot question as to how finely to subdivide, or how grossly to lump, any long series of populations which are uninterrupted in continuity and which show gradual modification throughout the extent of their occurrence.

It is not my purpose in this paper to discuss this big and difficult question at any length, but my aim is to present one certain case. When one sets himself the task of selecting names for all the birds occurring within a given state, as I have for California, he must solve this kind of problem as best he may, on the basis of materials in hand and of concepts which have to do with their interpretation. The student of the ornithology of Oregon has the same problem concerning subspecies from the south that the student of ornithology of California has concerning subspecies from the north.

Then, too, there is the relation of coast-belt forms to those of the territory lying immediately interiorward. The latter, in some instances, dominate the faunal scene clear to the seacoast; for example, in northern California, the Blue-fronted Steller Jay. In other cases the coast-belt forms extend far interiorward; for example, the Chestnut-sided Chestnut-backed Chickadee.

Now as to the Red-breasted Sapsucker: The 1931 (fourth) edition of the A. O. U. Check-list (p. 193) says of *Sphyrapicus varius ruber:* "Winters south to Monterey, California." This statement, which I now believe wrong, was probably based in part, at least, upon my own misunderstanding of the facts; for I had made the same statement previously in several places (for example, Pac. Coast Avif. No. 11, 1915, p. 79). Briefly, I now find no specimen of Red-breasted Sapsucker in available collections from California that I can properly call *ruber;* all, even from the extreme northwest coast belt, are *S. v. daggetti.*

In Detail: True *ruber* is represented before me (this at the time of my writing, in 1935) by specimens from Vancouver Island, coastal British Columbia (a magnificent series in the McCabe collection) and southeastern Alaska. The characters of the race are outstanding, in mass-effect, as compared with *daggetti.* Not one breeding bird from California is found to duplicate exactly any bird in that series of *ruber.* Nos. 44550 and 67827, Mus. Vert. Zool., are juvenals, July 7 and 5, from Carlotta, Humboldt County, and Poker Flat, northwest of Happy Camp, Siskiyou County, respectively. These two birds must represent the breeding population of extreme northwestern California. Difference shown by juvenals, in particular, must of course be inherent differences—at least, not as likely acquired as differences that are shown by old birds. The two skins in question, as compared with specimens in corresponding plumage from the Sierra Nevada and the mountains of southern California, on the one hand, and specimens from Vancouver Island on the other, while showing tendencies toward *ruber* are very much on the *daggetti* side of the "fence"—if we define said fence as being the mid-line between the mean of subspecific characters in each of the two races. The characters here concerned are: Size of bill; depth of sootiness of color tone on sides, chest and back; relative amount of white-flecking on back; yellowish tinge versus whiteness of dorsal flecking; relative sizes of white spots on outer webs of primaries; relative quantity of white at ends of innermost secondaries;

proportion of white to black on innermost webs of central pair of rectrices. In these features *daggetti* lies toward the extreme of small size of bill, paleness of color tones, and restriction in extent of white markings.

There is just one specimen in the MVZ collection from California, representative of all seasons and ages, that is in any troublesome degree equivocal. This is no. 16769, a yearling male, from Cuddeback, Humboldt County, hence from the midst of the coastal redwood belt. Because of its generally dark tone of color, yellowish tone of flecking on dorsum, and especially minimum of white on inner webs of central rectrices, it has until now been labeled *ruber*, rather than *daggetti*. And from its date of capture, October 4, I formerly argued that it was a newly arrived winter visitant from more or less far to the northward within the breeding range of *ruber* proper. Certainly this specimen, given quick comparison with specimens of like age and season from the metropolises of the two races named, could be thrown out of *daggetti*. There is no question but that it *is* intrinsically a departure from *daggetti* toward *ruber;* it is of slight degree just this. But closest scrutiny now convinces me that in certain features (small size of bill, lesser amount of white tipping on inner secondaries, great extent of [yellow-tinged] white flecking on dorsum) this specimen falls short of *ruber*. Its immaturity and the early date of its capture indicate its having been in or very close to its birthplace, hence not a migrant; its characters are accounted for as somewhat extreme for its population, which population anyway shows intermediacy from *daggetti* toward *ruber*. I have accordingly changed the name on the label of this specimen to read *daggetti*. Since it offered the only evidence at hand that true *ruber* migrates as far as California, if that northern race be migratory at all (Allan Brooks records it as wintering regularly at Comox, on Vancouver Island, and I have just learned that it winters at Victoria and Vancouver), then current statements must be modified. Incidentally the name *ruber* must be expunged from the California "state list;" the total number of forms for California is reduced from 610 to 609. It is as important to subtract as to add!

Now someone with a nose for new opportunities to name subspecies will have sensed from my remarks the fact that Red-breasted Sapsuckers from northwestern California do show intrinsic differences from populations of the Sierra Nevada and to even greater degree from those of southern California. Therefore, if the northwestern California birds are at the same time yet more different from true *ruber*, why shouldn't they constitute a separately nameable form? At the present moment, that is, with only the materials now in hand, I answer that there is nothing to indicate more than gradual blending up and down the coast belt and, at the north, from the coast belt toward the interior. (Specimens from Salem and Corvallis, Oregon, are far nearer to extreme *daggetti* than to *ruber*.)

In general: The status of our knowledge of the systematics of American birds falls short of the ideal. Nothing whatever should be taken by the critical systematic student as established fact. Many mistakes made long ago, on basis of insufficient material and inadequate consideration of many kinds of evidence, are carried along, in the A. O. U. Check-list and from text-book to text-book; and they will continue to be carried along until and *unless* scouted out, as a result of the most critical painstaking scrutiny. Citing an example, does the Red-breasted Sapsucker on the Pacific Coast migrate? Current treatment answers *yes;* but the examination just made, initiated for purely taxonomic reasons, indicates quite to the contrary—that its populations, save for local, chiefly vertical shiftings, are relatively sedentary.

Museum of Vertebrate Zoology, University of California, Berkeley, September 15, 1935.

FROM FIELD AND STUDY

A Northern Record for the Gray Titmouse in Oregon.—On February 9, 1936, while looking for winter birds in the Blitzen Canyon, Steens Mountains, Harney County, Oregon, I was attracted by the call of a titmouse, coming from a tangle of dead willows in a dry wash at the base of the canyon wall. The bird was collected, and it proved to be an adult female *Baeolophus inornatus griseus*. This species is extremely rare in Oregon, the only other records of its occurrence being in the juniper belt just west of South Warner Valley, Lake County, near the California-Nevada border.—STANLEY G. JEWETT, *Burns, Oregon, October 27, 1936.*

The Effect of Smudging upon Birds.—During California's recent cold wave, I spent the day of January 25, 1937, observing birds at the mouth of San Gabriel Canyon, some three miles north of Azusa, Los Angeles County. The sun was seldom visible through the dense blanket of smudge which had periodically covered many miles of the near-by citrus groves for the previous week. I mention this fact to introduce the cause of such a marked change in the appearance of the birds throughout this area.

Those birds most noticeably blackened were the House Wren, California Thrasher, Audubon Warbler, Willow Goldfinch, Golden-crowned Sparrow, Rufous-crowned Sparrow, California Towhee, and Pallid Wren-tit. Some were so heavily covered with smudge that the natural colors could hardly be imagined, while others were only slightly darkened on the chin and forehead. The latter inhabit areas less densely covered, which are not protected by trees or overhanging growth.

Of particular interest was the normal activity of all the species. At least outwardly they showed no evidence of being bothered by such an abnormal environment. A Rufous-crowned Sparrow was singing; others were feeding and flying about in their usual cheerful manner. Evidently the small amount of carbolic acid present in the crude-oil vapor is not enough to be fatally poisonous. When considering the great quantity of seeds and animal matter consumed, it seems unlikely that smudging could have a poisonous effect upon our birds, even should it continue many days. Luckily, that will probably never be necessary.

To give some idea as to how completely saturated the poor little fellows were, I might mention the difficulty I had in even partly restoring specimens to their normal color. Even solutions that normally dissolve grease and oil with ease I found to be of little use. I doubt if the bird itself could be instrumental in restoring its natural color. The spring molt will most likely be the only remedy.—GILBERT PHILP, *Beverly Hills, California, January 30, 1937.*

Ring-necked Duck in Ventura County, California.—A male Ring-necked Duck (*Nyroca collaris*) was found dead near Fillmore, Ventura County, January 27, 1937, and it was forwarded to the Los Angeles Museum by Sidney B. Peyton. It was mounted for display in a southern California duck group.—G. WILLETT, *Los Angeles Museum, Los Angeles, California, February 1, 1937.*

Parasites of Fish-eating Birds at Yellowstone Lake, Wyoming.—In the course of studies of the cestode parasites of trout in Yellowstone Lake, Wyoming, the digestive tracts of some 22 specimens of fish-eating birds, of eleven species, were examined in an effort to determine possible hosts. Four adult White Pelicans (*Pelecanus erythrorhynchos*), examined from the colony on the Molly Islands, gave results as follows:

June 22, 1931: *Contracaecum spiculigerum* present in large numbers in both esophagus and stomach; stomach also contained one mature trout (*Salmo lewisi*); the small intestine contained one small tapeworm (*Hymenolepis* sp.) and two larger tapeworms (*Diphyllobothrium cordiceps*).

June 22, 1931: *C. spiculigerum* present in large numbers in esophagus and stomach; stomach contained one mature, gravid, female trout; small intestine contained one small tapeworm (*Hymenolepis* sp.).

July 1, 1931: 17 small specimens of *C. spiculigerum* present in stomach; 2 *Hymenolepis* sp. present in small intestine.

July 23, 1931: Stomach contained the remains of one gravid female trout, and a large number of *C. spiculigerum*; two species of cestodes (*D. cordiceps* and *Oligorchis longivaginatus*) were present in the intestine.

Examination of three pelicans from Great Salt Lake Valley, Utah, in the spring of 1932 at the University of Utah, revealed large numbers of *C. spiculigerum* in the esophagus and stomach but failed to reveal any specimens of *D. cordiceps*.

Of three young pelicans examined on the Molly Islands, a week-old individual had no fish food in its stomach and no parasites; one two weeks old with its stomach filled with fish food had

no parasites; the third one three weeks old with its stomach full of partly digested fish contained ten specimens of a nematode (*Contracaecum spiculigerum*).

A specimen of American Merganser (*Mergus merganser americanus*) contained two immature specimens of a tapeworm (*Diphyllobothrium* sp.) in the intestine. One out of two California Gulls (*Larus californicus*) examined, contained two immature tapeworms which were not identified. One of two Swainson Hawks (*Buteo swainsoni*) contained numerous unidentified cestodes in the intestine. One out of three Ospreys (*Pandion haliaëtus carolinensis*) contained a viable plerocercoid of *D. cordiceps* embedded in the flesh of a newly eaten trout found in the crop, but there was none parasitic in the intestine.

No tapeworm parasites were found in any of the following: 1 Eared Grebe, 1 Treganza Blue Heron, 1 Red-tailed Hawk, 1 Bald Eagle, 1 Common Tern, and 2 Caspian Terns.—LOWELL A. WOODBURY, *Department of Zoology, University of Utah, Salt Lake City, January 30, 1937.*

Notes on Range of Bendire Thrasher in Arizona and New Mexico.— Published records for Bendire Thrasher in northern or central-eastern Arizona appear to be few, and for New Mexico there are only two. The following records extend the known range of the species some distance northeast of the present accepted limit. Specimens mentioned are in the Jenks collections in the Museum of Vertebrate Zoology and in the Arizona State Museum at Tucson.

An adult male was collected by Stevenson, June 27, 1934, on the sage-brush plains of the Upper Sonoran Zone, 14 miles southeast of Navajo, Apache County, Arizona, elevation 6200 feet. The testes of this bird were greatly enlarged, probably indicating that it was breeding in the vicinity.

E. C. Jacot saw a few Bendire Thrashers between October 4 and 6, 1935, in the Lower and Upper Sonoran zones in the vicinity of San Carlos, Gila County, Arizona. He observed one or two daily there on February 21, 23, 29, and March 1 and 3, 1936. These birds were found in thick brush and cactus-covered hillsides. Jacot collected a male, February 21, 4 miles north of San Carlos, in juniper woodland, elevation 2700 feet.

A flock of 4 was seen by Jenks, July 5, 1936, at Miller's Ranch, in a juniper-pinyon stand, Upper Sonoran Zone, Catron County, New Mexico, elevation 6500 feet. This ranch is approximately 25 miles east of Springerville, Arizona, and, therefore, about 10 miles east of the Arizona-New Mexico line. An adult male and two juvenals not yet able to fly were collected.

Bailey (Birds of New Mexico, 1928, p. 557) writes that this thrasher has been found only in extreme southwestern New Mexico, where it is recorded from Hachita, Grant County, August 12, 1908, and from 10 miles northeast of Rodeo, Hidalgo County, where it was found nesting June 18, 1926.

Swarth (Pac. Coast Avif. No. 10, 1914, p. 73), in describing the range of the species in Arizona, states that it is locally a common resident of the Lower Sonoran valleys of the southeastern and northeastern parts of the state, but apparently it has an "exceedingly irregular and disconnected range." He states that it is abundant in the Santa Cruz Valley of southern Arizona and common in the plains and valleys from Tucson northwest to Phoenix and Gila Bend. Swarth includes a published record of this thrasher in summer in northeastern Arizona at Keams Canyon, Navajo County. Another published record not included in Swarth's list is that of an immature bird taken by A. K. Fisher at Holbrook in July, 1894 (Condor, vol. 5, 1903, p. 35).

The Bureau of Biological Survey collection in Washington, D. C., contains a number of Arizona specimens not mentioned in Swarth's List, which add to the knowledge of the distribution of this species. There are specimens taken at Sunset Pass, 18 miles southwest of Winslow, by E. W. Nelson, July 16, 1909 (im.), and 26 miles northeast of Flagstaff, Coconino County, by E. A. Goldman, June 25, 1933 (ad. male). The collection also contains an adult male taken July 17, 1914, by E. G. Holt at Safford, Graham County, in southeastern Arizona.

Adult and immature specimens have been collected by A. R. Phillips from Tuba City, Coconino County, in northeastern Arizona. The only other published record from northern Arizona is that of F. Stephens from Beale Spring, 3 miles northwest of Kingman, Mohave County, in northwestern Arizona. Farther south it has been taken in Yavapai County by W. P. Taylor at Congress Junction, June 22, 1916 (Biol. Surv. coll.) and at Mayer, June 10, 1931 (adult female) and Big Bug Creek, March 11, 1930 (adult male), by Jacot (Univ. of Arizona coll.).

These notes show that the Bendire Thrasher is somewhat more widely distributed in Arizona and New Mexico than is indicated in the texts on the birds of these states. The authors appreciate the kindness of authorities of the U. S. Biological Survey in granting permission to report on certain specimens in their collections.—RANDOLPH JENKS, *Arizona State Museum, Tucson, Arizona,* and JAMES O. STEVENSON, *Wildlife Division, National Park Service, Washington, D. C., December 21, 1936.*

Killdeer Nests on Roof of Building.—On March 26, 1936, I was informed by the building inspector at Benicia Arsenal, Benicia, California, that a Killdeer (*Oxyechus vociferus*) was sitting on four eggs on the roof of the Artillery Storehouse, a one-story building housing various pieces of field artillery, tanks, tractors, cannon, and howitzers. The skylights on the roof of this building were being repaired, and the attention of the workmen had been drawn to the sitting bird which, after having become accustomed to their presence, sat closely while the work progressed.

On March 31, the inspector, Mr. O. Mendler, advised me that the eggs had hatched, three

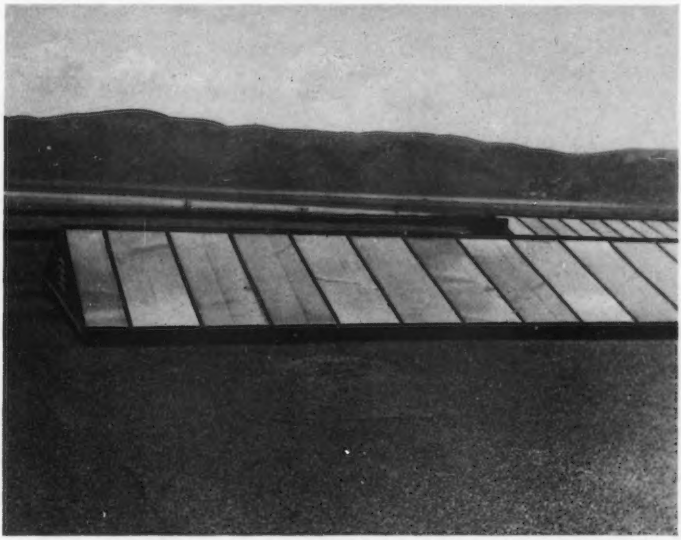

Fig. 37. Section of roof at Benicia, California, showing nesting site of Killdeer (in front of skylight).

young had left and one still remained in the nest. On the following day I took my camera, climbed the ladder to the roof and took the accompanying picture (fig. 37) showing the location of the nesting site of this pair of Killdeers, about three feet from the skylight in the center of the photo. The birds had made a slight depression in a small accumulation of gravel which had apparently been left by the roofers who had gravelled or regravelled the roof in a previous year.

I requested Mr. Mendler to keep an eye on these birds to see if they would lay a second set. On April 28, he informed me that a Killdeer was on the roof and sitting on four eggs. This second set was on another section of the same roof about ten feet from another skylight (see fig. 38). There was no depression in this case, as practically all of the gravel was imbedded in the tar which had been applied prior to the spreading of the gravel. This second set also hatched successfully.

The building was about two hundred yards from the shore of the Carquinez Straits. The location was favorable to the birds, at least in that it was out of reach of prowling mammals.—EMERSON A. STONER, *Benicia, California, August 24, 1936.*

Fig. 38. Second set laid by Killdeer on gravel roof of storehouse at Benicia Arsenal.

A Blue Goose Record from Utah.—On October 13, 1936, R. C. Winslow and V. T. Wilson reported an adult Blue Goose (*Chen caerulescens*) in unit 1 of the Bear River Migratory Bird Refuge in Utah. The bird was with approximately 250 Snow Geese (*Chen hyperborea hyperborea*) feeding shortly after 4 p.m. in salt grass. The observation was checked immediately by Superintendent G. E. Mushbach and me. We were able to drive within 100 yards of the birds, and, since we had the sun at our backs, light conditions were excellent. Both 8x field glasses and a 19.5x field telescope were used in observing the birds, though, even as they flew a short distance, owing to our disturbing them, we could pick out the single Blue Goose with the naked eye.

A close watch was kept for this bird during the rest of the fall season, but it was not seen again. This appears to be the first record of this species for the State, as the records of the three universities and of the Biological Survey show no previous notes. Veteran hunters of this area were also questioned, but none reported ever having seen or taken such a bird on the Bear River Marshes.—WILLIAM H. MARSHALL, *Bureau of Biological Survey, Brigham City, Utah, January 27, 1937.*

Some Winter Field Notes from Monterey County, California.—From our winter field operations in Monterey County (December 21, 1936, to January 15, 1937), the following observations seem worthy of record at this time.

Pelecanus erythrorhynchos. White Pelican. Eleven individuals were observed by R. L. Rudd and the junior writer on December 21, 22, and 23, in company with a large number of California Brown Pelicans (*Pelecanus occidentalis californicus*) on the lagoon at the mouth of the Salinas River. The occurrence of White Pelicans along the coast on a body of brackish water seems sufficiently unusual to warrant being recorded.

Casmerodius albus egretta. American Egret. Fifteen American Egrets were observed by Rudd and von Bloeker, December 21 to 23, in the salt marsh at the mouth of the Salinas River. Insofar as we know this is the largest number of these birds seen at any one locality in Monterey County within recent years.

Egretta thula brewsteri. Snowy Egret. A single Snowy Egret was seen perched on a low eucalyptus limb at the western edge of the Moss Landing salt marsh on the afternoon of December 29, and one was seen in the same place on the following morning.

Cygnus columbianus. Whistling Swan. On the morning of January 14, we saw a flock of twenty-six Whistling Swans flying in V-formation across the Prunedale Highway, three and one-half miles north of Salinas. They were about twenty-five feet above the ground and flying east toward Gabilan Peak.

Chen rossii. Ross Goose. A male of this species was found on the rocks at Point Pinos on the morning of December 29. It had been dead for several days when found, having been shot through the back by a .22 caliber bullet. The specimen was preserved as a skeleton.

Nettion carolinense. Green-winged Teal. A pair was observed on the morning of January 8 by L. O. Williams and von Bloeker on the Salinas River at the mouth of El Toro Canyon. The male was heard calling several times.

Nyroca americana. Redhead. Two males were observed on the lagoon at the mouth of the Salinas River on the afternoon of December 21, in company with a large flock, estimated at over one thousand, of Canvasbacks (*Nyroca valisineria*).

Erismatura jamaicensis rubida. Ruddy Duck. Ruddy Ducks were found to be common at the mouth of the Salinas River, on the Salinas River at the mouth of El Toro Canyon, on the lagoon at Seaside, on the lake at Del Monte, and on the estero at Monterey. The only reason for including them in this list is to deplore the fact that so many were found dead, apparently shot by hunters for target practice and then left to rot. Many such dead birds were found at the mouth of the Salinas River, and several were seen at Seaside and at the mouth of El Toro Canyon.

Aquila chrysaëtos canadensis. Golden Eagle. A Golden Eagle was found at the mouth of El Toro Canyon on the afternoon of December 31. It had been shot, and we found it in a bad state of decomposition. On January 10 a pair was observed resting on top of a hill in Wild Horse Canyon, east of San Lucas, and on January 14 a single individual was seen perched on a large boulder near the top of the old San Juan Grade, in the northeastern part of the county.

Totanus flavipes. Lesser Yellow-legs. A pair of these birds, one of which was collected, was observed at the southeastern edge of the lagoon at the mouth of the Salinas River in company with a large flock of Pintails (*Dafila acuta*) on the afternoon of December 23.

Stercorarius parasiticus. Parasitic Jaeger. One was observed on the lagoon at Seaside on January 5, and one was seen flying over the estero at Monterey on the morning of January 8. The occurrence of these two individuals over the mainland seems sufficiently unusual to merit recording.

Larus hyperboreus. Glaucous Gull. A male of this species was collected at the Seaside lagoon on January 5, making the fourth specimen known for this county. The right wing of this bird had been broken by a rifle slug, and it was badly infected with gangrene when the individual was captured. Two additional individuals were seen at this locality on this same date, and two more were observed by L. O. Williams and von Bloeker at the estero in Monterey on January 8.

Tyto alba pratincola. Barn Owl. The recent cold spell, in which the thermometer dropped as low as 20°F. (the coldest temperature recorded in 18 years) in the Salinas district, apparently caused the small, normally nocturnal mammals of this region more or less to cease activities at night, and it forced them abroad more in the daytime. As a result, owls were obliged to do their foraging by day, too. This we found the Barn Owls and a Short-eared Owl (*Asio flammeus*) doing in the salt marsh at the mouth of the Salinas River during our operations there. On December 23, one Barn Owl which too closely encroached upon the territory of a Marsh Hawk (*Circus hudsonius*) had the temerity to attempt to "stand its ground" when attacked by the hawk. For several minutes feathers were flying as the birds met face to face in the air and struck at each other with feet and wings. Finally the Barn Owl, apparently realizing it was no match for its adversary, dodged off to one side and rapidly flew away while the hawk returned to its perch to preen its ruffled plumage.

Phalaenoptilus nuttallii californicus. Dusky Poor-will. On the evening of January 7, while setting traps for small mammals at Camp Ord, 3½ miles east of Marina, Rudd and von Bloeker heard the call of a Poor-will. The call was repeated a number of times.

Aëronautes saxatalis saxatalis. White-throated Swift. A large flock, numbering approximately 150 individuals, was observed each day from January 1 to 9 at the mouth of El Toro Canyon. Sometimes the flock behaved as a unit, soaring, wheeling, and turning *en masse*. At other times, the individuals flew according to their own whims, each independent of the flock. In such instances the group would become widely scattered in the air, then suddenly, as if some signal had been given, they would gather together again and fly in flock formation as a unit again. Four specimens were collected in this locality on January 1. On January 10 flocks of seven in Chualar Canyon and eight in Wild Horse Canyon were seen.

Tachycineta thalassina lepida. Violet-green Swallow. Swallows of this species were observed in small numbers in company with a large flock of nearly 300 Tree Swallows (*Iridoprocne bicolor*), flying over the Salinas River at the mouth of El Toro Canyon every day between December 31 and January 9. We estimated the ratio of Violet-green Swallows to Tree Swallows in this mixed flock to be one to twenty.

Sialia currucoides. Mountain Bluebird. A small flock of seven individuals was seen flying on the morning of January 3 across the road at Camp Ord in a northwesterly direction.—O. P. Silliman, *Salinas, California*, and Jack C. von Bloeker, Jr., *Museum of Vertebrate Zoology, Berkeley, February 15, 1937*.

The Harris Sparrow in Northwestern Montana.—On October 2, 1936, while watching a flock of Gambel Sparrows (*Zonotrichia leucophrys gambelii*) that had been feeding daily for more than a week on weedseeds at my farm home near Fortine, Montana, I discovered among them a bird entirely new to me. After continued study of the bird from as near as four feet, I identified it as an immature Harris Sparrow (*Zonotrichia querula*). It was seen again the following day; and on October 4 and 5 two birds of this species fed with the Gambel Sparrows.

On the morning of October 6 there were five Harris Sparrows in the mixed flock, of which one was taken by a hawk later in the day. The remaining four birds fed about the yards, sometimes by themselves and sometimes with the Gambel Sparrows, for more than a week. In keeping with the usual crepuscular habits of *Zonotrichia*, these four birds regularly frequented the feeding-grounds in the deep twilight of early morning and late evening. The Gambel Sparrows began to thin out as some resumed their migration, the last one of the season being seen October 14. The four Harris Sparrows, however, all remained until October 15; two were seen daily from that time until October 20.

Though there seems to be no previous record of the occurrence of this species west of the continental divide in Montana, this region is within the general range covered by casual occurrence of the Harris Sparrow in migration. But to me it seemed remarkable that after watching migrating *Zonotrichia* about my home during twelve seasons, my first record of the Harris Sparrow should involve five migrating birds that used a common feeding-ground, that did not appear or remain together, and that seemed to be migrating in at least two groups. A possible explanation is that these five birds together moved southward from their summer home in company with Gambel Sparrows, and so reached this locality west of the main range of the Rockies. This explanation, however, is weakened by the fact that the Harris Sparrows did not travel as

a unit flock, but they appeared together only at times at a favorable feeding-ground, and by the fact that all of them remained here after the last Gambel Sparrows had departed.

During the morning of October 6, while the five Harris Sparrows then present were feeding on the ground about thirty feet from my house, I slowly approached them with a camera in hope of securing a distant photograph of the group. As I stood in full view about twelve feet from the birds they suddenly scattered precipitately. A blur of feathers hurtled into a small birch tree about a rod from where I stood, and a second later there emerged a Sharp-shinned Hawk carrying one of the sparrows in its talons. Almost before I realized what was happening, the hawk with its prey skimmed by within two feet of my shoulders, skirted a corner of the house, and disappeared. A few seconds later the remaining four Harris Sparrows were again picking up weedseeds in the spot they had been forced to vacate so suddenly.

As the birds did not fully conform to any of the available published descriptions of the varying plumage of this species, I venture to include here a digest of my incomplete notes taken and rechecked at various times as I observed these Harris Sparrows daily for three weeks. It is perhaps significant that the five birds were practically identical in size and plumage coloration. "General comparison with Gambel Sparrow: decidedly larger and heavier, about three-quarters of an inch longer; back, wings, and tail much as in *gambelii*, but with streaks on back more uniform in width, the contrast between brown and gray not so marked; wings with narrow whitish or pale buffy bars, tips of primaries margined with whitish; tail without light markings. Entire head and neck except throat, an unmarked light brown, forming a hood (suggestive of a female towhee) that cuts sharply across the breast; no suggestion of black on crown; center of throat with a wedge-shaped patch of clear white narrowly margined at the sides with deep brown or black. Brown head 'hood' separated from the clear white underparts by a conspicuous band of dark brown or black spots and streaks, this band widened at the center to form a large, triangular patch narrowing downward through the central part of the breast. Sides of chest, flanks, and under tail-coverts heavily washed with medium brown. All markings of throat and breast very distinct and conspicuous, with no merging of outlines or colors." Thus the birds appeared to me in life.—WINTON WEYDEMEYER, *Fortine, Montana, March 11, 1937.*

Notes on the Saw-whet Owl.—The known breeding range of the Saw-whet Owl (*Cryptoglaux acadica*) extends southward in the mountain ranges of western North America to southern California (San Jacinto Mountains, Stephens, Condor, vol. 4, 1902, p. 40), southern Nevada (van Rossem, Pac. Coast Avif. No. 24, 1936, p. 24), central Arizona (San Francisco Mountain, Mearns, Auk, vol. 7, 1890, p. 54), and probably northern New Mexico (Bailey, Birds of New Mexico, 1928, p. 338). But also the species is known from Mexico south to Vera Cruz. A related species occurs in the arid tropical zone in Guatemala (Griscom, Am. Mus. Nov., no. 438, 1930, p. 1). It is entirely in keeping with this widespread occurrence that this owl should be found in southeastern Arizona, and it is only surprising that it has not heretofore been met with in this section of the western cordillera.

On the evening of May 18, 1936, in Bar Foot Park, 8300 feet, in the Chiricahua Mountains, Cochise County, Arizona, the rhythmic whistling of a Saw-whet Owl was heard at a distance. The next evening at twilight, just after the Whip-poor-wills had become active, one of these owls began calling in some low aspens at the foot of a talus slope near camp. I had no difficulty in approaching the bird and shining its eyes. The owl was collected (no. 68855, Mus. Vert. Zool.) and proved upon dissection to be a male, with testes 7 mm. in length. At 2:30 a.m., the same night, I again heard the notes of a Saw-whet in the distance. A lengthy stalk, lasting more than half an hour, was made possible by the continuous calling of the bird. Although I could not induce it to move toward me by imitating its note, it was not disturbed by my noisy approach through two hundred yards of deciduous oak scrub on a talus slope. Finally its calling tree was reached, a dense *Pseudotsuga* on the crest of a ridge bounding the park. There it remained effectually concealed in the dense foliage immediately overhead. With every gust of wind, it stopped calling, and finally, shortly before daybreak, it ceased altogether.

This experience substantiated a belief that, several years before, I had called one of these owls into camp one night in the Sierra Ancha, Gila County, central Arizona. In the evening of June 6, 1931, on Workman Creek, west of Aztec Peak, in the low Transition zone of these mountains, at 5500 feet, the rhythmic whistle of this owl was heard. The note was coming from a steep slope above a cliff on the north-facing side of the canyon. After my imitation of it for about 15 minutes, the bird came down into the canyon bottom, fluttered overhead, and perched close to me in an open tangle of live oaks and alders. There it called excitedly and loudly. In the beam of the light it appeared distinctly yellow, and no ear tufts were noted. Unfortunately an effort to collect it failed.

It has been a matter of surprise to me since then that the Saw-whet occurred so low in the Sierra Ancha in the breeding season. But further evidence of tolerance of conditions that are almost Upper Sonoran now is at hand. On July 24, 1936, F. G. Palmer collected a juvenal *Cryptoglaux* (no. 69522, Mus. Vert. Zool.) 4 miles south of Hernandez, San Benito County, California. The exact locality was Laguna Ranch, 4000 feet. The arid inner coast ranges of central California have only a scant representation of the Transition zone. The owl was taken in a black oak and Coulter pine woodland. This record represents the only known instance of breeding in the central coast ranges of this state.

So many diverse accounts of the Saw-whet Owl's notes have appeared in the literature, that it might be well to stress that the notes which I have traced to this species have been uniform in type. Presumably all the birds encountered were sexually active males. The notes consist of round, almost liquid whistles that are repeated at the rate of nearly two per second, rarely with the faintest trace of an aspirate. The pitch varies slightly, but it averages about C or C#, two octaves above middle C, which is near, but slightly higher than, the notes of Pigmy Owls. The notes are repeated without interruption for long periods. Great change in intensity is characteristic, and at a distance the notes fade out completely. A bird which was watched in midafternoon (3 p.m.), June 2, 1934, near Bowron Lake, British Columbia, called continuously for 15 minutes. At 25 feet, the notes were sometimes barely audible, but the bird, which remained quiet with its head thrust out of a woodpecker hole, could be seen moving the mandible in unbroken rhythm. Notes distinctly different from those here described evidently are given on other occasions.

Ridgway (Birds N. and Middle America, vol. 6, 1914, p. 629) mentions "a slight average difference in the hue of the brown of the upper and under parts" of Saw-whet Owls in different geographic areas. The color is "more grayish brown in those from the Rocky Mountains." Van Rossem (*loc. cit.*) questions whether pale birds taken in the Charleston Mountains of Nevada may not represent an undescribed race. In handling the bird from the Chiricahua Mountains in the field, and later upon comparing it with other Saw-whet Owls, the grayish-brown dorsal coloration, the paler streaking below, the more prominent white on the forehead, and the greater amount of white in the lateral scapular area were striking comparative features. These observations accord with those of van Rossem and, as further evidence, lend support to the idea that these birds from desert ranges may be more than just individual pale variants.—ALDEN H. MILLER, *Museum of Vertebrate Zoology, Berkeley, California, March 16, 1937.*

Notes on Leg Colors of White Herons.—In connection with the questions raised by Dr. Loye Miller (Condor, vol. 39, 1937, p. 17), the experiences of easterners may be of some assistance to those who would like to settle the status of *Florida caerulea* in California. Snowy Egrets may be identified with absolute certainty at close range by their strikingly colored yellow feet which no Little Blue Herons ever have. Less important, but extremely useful when direct comparison is available, is the shape of the birds' bills—thin and tapering in the Snowy, a bit broader at the base in the Little Blue and slightly more curved along the top. The Little Blue never has black legs but those of the Snowy may vary in color. In summer around New York and New Jersey, a single Snowy may show black legs when viewed from one angle and distinctly yellowish green ones when viewed from a different direction. This has been kindly explained to me by Charles A. Urner: the legs are black with a narrow band of yellowish green extending down the posterior surface.

In checking on three caged birds last fall, I found all birds had black legs, one entirely so, another with gray on the posterior side of the tibia, a third with a narrow band of yellowish green extending dorsally along the full length of both tibia and tarsus. Audubon described the color of young Snowy's feet as at first olive, and Forbush mentions birds in October with legs "yellow green marked black." Individual variation, for which an explanation is still lacking, may be found in the legs of other herons: Black-crowned Night Herons in the vicinity of New York often show pink instead of yellow legs. B. W. Tucker has likewise written (British Birds, vol. 30, 1936, pp. 70-73) of similar peculiarities in Buff-backed Herons (*Ardeola ibis ibis*).

Aside from the purely faunistic considerations, the correct identification of the small white herons may help in settling other interesting questions. The Snowy Egret, in common with the Louisiana Heron, has a propensity to race about while feeding. Could this be insect catching rather than fish hunting? Up to the present time field work in the East indicates that the Snowy's well known habit of stirring up prey in the water by a single foot extended forward is not possessed by other herons. While this would give us an extremely easy field mark, it also emphasizes that a definite biological correlation may exist between this unique feeding habit and the unusual color of *Egretta thula*'s feet.—JOSEPH J. HICKEY, *New York, N. Y., March 1, 1937.*

Spotted Owl Seen at Dundee, Oregon.—On the late afternoon of January 16, 1937, I observed a Northern Spotted Owl (*Strix occidentalis caurina*) in the Red Hills of Dundee, Yamhill County, Oregon, and I heard another. The owl was an adult. Jewett and Gabrielson mention this species in Pacific Coast Avifauna No. 19 (1929, p. 22) as rarely seen in Western Oregon.—HENRY W. DECKER, *Dundee, Oregon, January 31, 1937.*

White-tailed Kites Observed in Yolo County, California.—A pair of White-tailed Kites (*Elanus leucurus*) has been observed upon several occasions on Merritt Island, along the Sacramento River in the southeastern corner of Yolo County. For the past ten or more years these birds have lived as permanent residents in and near a small group of white oak trees standing in the open alfalfa fields away from the wooded bank of the river. No young birds of the species have ever been identified positively, but two large nests may be observed in the largest oak tree. Earlier in the season a young hawk was seen which I tentatively identified as an immature kite.—ALICE QUICK, *Berkeley, California, February 26, 1937.*

The Rocky Mountain Pigmy Owl in Montana.—On the morning of February 11, 1937, near the campus of the State University of Montana, I saw a peculiar bird fly into a clump of firs, which upon investigation proved to be not one but two birds, one alive, the other dead. The living one was a Rocky Mountain Pigmy Owl (*Glaucidium gnoma pinicola*). Clutched in its talons was a Junco, probably Shufeldt Junco (*Junco oreganus shufeldti*). All attempts to make the owl drop its prey were unsuccessful. In looking up the food habits of this owl, I found references to its feeding on sparrows, quail, insects, and mice but no reference to the Junco. Consequently, I assume this to be a new record or at least an unusual instance of the feeding habits of this bird.—G. B. CASTLE, *Missoula, Montana, February 25, 1937.*

The Marbled Godwit and Sanderling in New Mexico.—The following observations were made at White Sands National Monument, Otero County, New Mexico. On the eastern side of the Sands there is a small lake and marsh which recently has been acquired as an extension to the Monument.

Here on April 26, 1936, I observed two Marbled Godwits; they were extremely wary, and I was unable to approach closer than two hundred yards. They remained segregated from other shore birds, and they flew to some distant open shore of the lake each time they were disturbed. On July 11, I again visited the marsh and observed one of these birds, which I was able to collect. It proved to be a male Marbled Godwit (*Limosa fedoa*) in extremely worn plumage. There appears to be no former record of this species in the State of New Mexico.

On September 19, 1936, at White Sands National Monument, I collected a female Sanderling (*Crocethia alba*) in fresh fall plumage. The bird was alone, and it was feeding on a small mud flat at the edge of the lake. This constitutes the first verifiable record of this species in New Mexico, and it is the only record since the sight observation made in September of 1853 or 1854 by Dr. T. Charlton Henry (Proc. Acad. Nat. Sci. Phila., vol. 7, 1854-55, p. 315). He saw a few near Fort Thorn, which was located on the Rio Grande, ten miles west of Rincon, Dona Ana County, New Mexico.

The skins of these two birds have been placed in the Museum of Vertebrate Zoology at Berkeley, California, and bear numbers 70609 and 70610, respectively.—A. E. BORELL, *Wildlife Division, National Park Service, Santa Fe, New Mexico, January 3, 1937.*

Five Species New to Colorado.—We wish to record the following specimens, in the collection of the Colorado Museum of Natural History, representing five species which we believe to be new to the State list.

Water-turkey (*Anhinga anhinga*). Adult, C.M.N.H., no. 12296, September, 1927; Adams County, Colorado; collected by Jacob Muzik. Adult male, no. 12297, September 24, 1931; Adams County, Colorado; collected by A. Viraldo.

Glaucous-winged Gull (*Larus glaucescens*). Immature, no. 880, November 3, 1912; Weld County, Colorado; collected by T. Johnson. This specimen had been identified as *Larus argentatus*. We submitted it to Dr. Harry C. Oberholser for identification, and he stated that this is apparently the easternmost occurrence for *glaucescens*.

Russet-backed Thrush (*Hylocichla ustulata ustulata*). Female, no. 14631, September 22, 1934; Denver County, Colorado; collected by H. H. Nininger. Found dead in City Park, near the Museum. The identification was verified by Oberholser.

Cerulean Warbler (*Dendroica cerulea*). Adult female, no. 15073, September 2, 1936; Douglas County, Colorado; collected by Bailey and Niedrach. Henshaw saw a Cerulean Warbler near Denver on May 17, 1883, and the species has been recorded in the literature subsequently on the

basis of this sight record. Apparently our specimen is the only one actually taken in the State. It was high in the cottonwoods along Cherry Creek, in company of many Audubon Warblers.

Chestnut-sided Warbler (*Dendroica pensylvanica*). Adult male, no. 12314, May 16, 1933; Adams County, Colorado; collected by Niedrach. H. G. Smith reported observing a Chestnut-sided Warbler in a little tree claim near Barr, Colorado, on May 13, and three days later Niedrach was fortunate enough to find the bird in the same locality.—ALFRED M. BAILEY and ROBERT J. NIEDRACH, *Colorado Museum of Natural History, Denver, Colorado, February 26, 1937.*

Notes on Eggs of the California Jay.—While collecting eggs of the Nicasio California Jay (*Aphelocoma californica oocleptica*) near Benicia, Solano County, California, in the spring of 1936, I was surprised to find sets running large in number of eggs. During my nineteen years in Benicia, it has been my experience that a set of six eggs might be located either once a season or once in two seasons. However, in the spring of 1936, nine sets of six eggs and one set of seven eggs of this Jay were taken here.

The set of seven is the first I have seen. The nest containing this large set was in a small live oak on a steep hillside six miles northeast of Benicia along the state highway, and it was constructed of sticks and weed-stems and lined with soap root. The eggs of this set are uniform in size, pattern of coloration, and incubation. Wilson C. Hanna also records a set of seven eggs of this species (Condor, vol. 38, 1936, p. 39).

In the vicinity of Benicia, the ratio of sets of the "red" type to sets of the "green" type is about one to four. I have taken some beautiful specimens of the former type. *All* of the twenty-one sets of six, and one set of seven, which I have recorded as having been taken here, are of the "green" type. This surely is not a coincidence; it seems to indicate that the Jays, in the aggregate, which lay the "red" eggs are less prolific, therefore possibly of somewhat less strong vitality, than those producing the "green" type.—EMERSON A. STONER, *Benicia, California, September 7, 1936.*

NOTES AND NEWS

The twelfth annual meeting of the Cooper Ornithological Club, held in Berkeley April 16 to 18, was largely attended and was marked by several features of memorable interest. The dinners, luncheons and field-trip afforded favorable opportunities for personal association; and the four half-day sessions provided a program of 28 papers presented by 26 individuals. A full report of this meeting is on our docket for printing in July *Condor*, from the pen of Laura B. Law, Secretary of the Board of Governors.—J.G.

There may prove to be great importance in taking and keeping photographs of unusual birds that are banded and released. It is a rule with many compilers of regional lists, to exclude records of rare species that are not backed by "specimens preserved." Well nigh as convincing "evidence" as the study-skin is afforded by a photograph, especially when so taken as to show the diagnostic characters of the species. Even the subspecies can sometimes be told from a good photograph. Future doubt as to correctness of identification can thereby be met convincingly. See, for example, in the last issue of the *Condor* (p. 86), Miss Frances Carter's record of the White-winged Dove at Twenty-nine Palms, accompanied by a picture of the bird banded and about to be released.—J.G.

Part X of the "Catalogue of Birds of the Americas" by Hellmayr was issued in the past month; it covers the Family Icteridae. This section is consistent in style and treatment with other parts of this useful synopsis of the systematics of New World birds. A note by the editor of the series, Wilfred H. Osgood, indicates an early appearance of an additional part to include the Fringillidae.—A.H.M.

The *Journal of Minnesota Ornithology* is the title of a new publication devoted to the recording of facts about the bird-life of one single state. The editor is Mr. John J. Cochrane, of St. Cloud, Minnesota; volume I, number 1 (dated April, 1936), is excellently printed, typographically clean — bespeaking careful editorial attention. Most appropriately, this first issue is dedicated to Dr. Thomas S. Roberts, so long and favorably known for the thoroughness and extent of his work on Minnesota birds; indeed, the organization which sponsors the publication is "The T. S. Roberts Ornithology Club."—J.G.

The objectives of the Migratory Bird Treaty with Mexico concluded in February of 1936 are of the best sort and the effort in the direction of conservation which they represent is to be commended. We do not pretend to know the complexities of the negotiations responsible for the list of species considered to be migratory by the parties to the treaty. But the list as approved does contain distinct surprises. Can a bird be made migratory merely by declaration? We find in the circular recently supplied to collectors by the Biological Survey such permanently resident forms as the Clapper Rail, Black-tailed Gnat-

Fig. 39. Dr. Louis B. Bishop, Life Member and member Board of Governors, Cooper Ornithological Club; author of many publications bearing upon the systematics of North American birds.

catcher, Cactus Wren, Bridled Titmouse and Arizona Junco accorded the status of migrants. Equally inconsistent are some of the omissions in the official lists relative to migratory birds of the United States and Canada. Such a situation invites contempt among the large body of persons informed in these matters that annually report their collecting activities to the federal government. Are the legal complications so formidable that these errors can not be corrected? —A.H.M.

An amazingly large amount of printed or mimeographed literature dealing with applied natural history reaches us these days. Nearly all of this proves worth while scanning; here and there the reader hits upon definitely new facts, new ideas, or new and apt statements of well known principles. In a recent report, for March, 1937, from the Texas Cooperative Wildlife Service, which is directed by Dr. Walter P. Taylor from headquarters at the Texas Agricultural and Mechanical College, we read (p. 9): "The game food problem in Dallas County is not one of getting food plants to grow, but of letting native plants mature and seed. If a farmer wants game, he will have to eliminate sheep and goats from his pastures or fence off and protect from grazing certain appropriate areas." The valid principle implied is that the usual type of heavy grazing is incompatible with maintenance on the same ground of any seed or grain eating birds whether of game or non-game kind. The greatest menace to the interests of the sportsman and bird-lover, aside from the over-indulgence of the former, is excessive grazing, and most grazing as now practiced is excessive. This inverse correlation, of grazing with wildlife production, holds at least as well for California as for Texas.—J.G.

The damage to birds from oil occasioned by the wrecking of an oil transport ship in the entrance to San Francisco Bay last March was particularly heavy among California Murres. Following this disaster some attention already has been given to the status of the colonies along the coast of central California. Reports from the Farallon Islands are encouraging, suggesting that the off-shore population was little affected; but the Point Reyes colony is reported to be almost non-existent. A timely endeavor during June of this year would be to make a census of breeding colonies within the area of oil damage.—A.H.M.

The Sierra Nevada Hermit Thrush is a well marked subspecies which has an extensive summer-time range along the Sierra Nevada within the boreal life-zone, mainly well above an altitude of 4000 feet. While doubtless thousands of individuals spend the summer and rear their young there, and all of this population winters somewhere south of the Mexican boundary, yet there is no record (definitely known at this writing) of an individual of this race from any California locality below, south of, or outside of, the breeding area. In other words, here is a bird for which there is no indication of lowland route of approach to, or departure from, its breeding area — despite the great amount of collecting that has been carried on at migration times. In the spring, the Sierra Nevada Hermit Thrushes simply *arrive* on their nesting grounds —can it be by a long-distance air-way high above the immediately southward terrain?—J.G.

MINUTES OF COOPER CLUB MEETINGS

NORTHERN DIVISION

JANUARY.—The regular monthly meeting of the Northern Division of the Cooper Ornithological Club was held on Thursday, January 28, 1937, at 8 p.m., in Room 2503 Life Sciences Building, Berkeley, with President Miller in the chair and 95 members and guests present. Minutes of the Northern Division for December were read and approved. Minutes of the Southern Division were read by title only. Minutes of the Stanford Chapter were read. Names proposed for membership were as follows: Robert

S. Bach, 404 U. S. Court House, Portland, Oregon, by E. L. Sumner, Sr.; Merrick Fred Hersey, Box 734, Crockett, California, and Frederick H. Dale, Inskip Power House, Paynes Creek, Calif., by J. M. Linsdale; Dr. Max Minor Peet, 2030 Hill Street, Ann Arbor, Michigan, by Josselyn Van Tyne; David H. Johnson, Museum of Vertebrate Zoology, Berkeley, by Emmet T. Hooper; Natasha D. Smith, 2203 Piedmont Avenue, Berkeley, by Frances Carter; Donald Stewart Brock, 5840 Seminary Court, Oakland, Calif., by E. I. Dyer; Mrs. Anne B. Terry, U. S. Veterans' Hospital, Palo Alto, Calif., by Wilbur V. Henry. A motion for the election of W. Lee Chambers to honorary membership in the Club was unanimously carried.

The secretary read a letter from Charles W. Davis, superintendent of the recreation department of Berkeley, thanking the Cooper Club for its interest in the bird refuge established at the aquatic park. Mr. Cain told of plans for adding to the swan population of Lake Merritt, for esthetic reasons, and also said that the identification pictures at the duck feeding station were to be renewed. He suggested that notices of meetings of the Cooper Club, Audubon Society and similar organizations, posted in that place, might serve as a means of contact with visitors interested in birds. Mr. Behle reported that the Alameda County branch of the American Wild Life Federation had held regular monthly meetings.

Mr. Linsdale presented the slate of officers for the coming year, as drawn up by the nominating committee: President, Eric C. Kinsey; Vice-president, Brighton C. Cain; Secretary, Hilda W. Grinnell; Recording Secretary, Frances Carter. It was moved and carried that the nominations be closed and the secretary be instructed to cast a unanimous ballot for the officers so nominated. President Miller then turned the meeting over to the incoming president, Mr. Kinsey.

The topic for the evening was "Winter Field Notes," and a great many members responded with observations of real interest and value. President Kinsey commented on the continued scarcity of some species, especially the Varied Thrush, in Marin County. Mr. Bond had seen large numbers of Varied Thrushes near Grants Pass, Oregon, on New Year's Day. There was some discussion of the effects of the recent cold weather on bird life, with the general conclusion that land birds showed a decrease, whereas an increase in waterfowl was noticeable locally. Mr. Dyer described in detail his method of reviving hummingbirds suffering from cold and lack of food. Mr. Dixon reported that Trumpeter Swans in Yellowstone National Park had succeeded in rearing a brood of six, last season. There were numerous reports of Christmas censuses and unusual records from various parts of the state. Mr. Grinnell announced that copies of the revised list, "Birds of the Berkeley Campus," were available. The problem of controlling the shooting of non-game birds was discussed, and the constructive suggestion of rifle ranges for boys, with instruction in the proper use of firearms, was offered.

Adjourned.—FRANCES CARTER, *Recording Secretary.*

FEBRUARY.—The regular monthly meeting of the Northern Division of the Cooper Ornithological Club was held on Thursday, February 25, 1937, at 8 p.m., in Room 2503 Life Sciences Building, Berkeley, with President Kinsey in the chair and about 85 members and guests present. Minutes of the Northern Division for January were read and approved. Minutes of the Southern Division and of the Stanford Chapter were read. Names proposed for membership were as follows: Mrs. Helene Kosby, 2585 Louis Road, Palo Alto, Calif., by Wilbur V. Henry; J. Dewey Soper, 827 Riverwood Avenue, Fort Garry, Winnipeg, Manitoba, Canada, by J. Grinnell; Howard K. Gloyd, Chicago Academy of Sciences, 2001 N. Clark Street, Chicago, Illinois, by J. M. Linsdale; Miss Margaret A. Barry, General Delivery, Stanford University, Calif., by Laidlaw Williams; Martin Dale Arvey, 2500 Durant Avenue, Berkeley, and Miss Jean Kennedy, 2550 Ellsworth Street, Berkeley, by Frank Richardson; Milton Lewis Seibert, 4649 Redding Street, Oakland, by Brighton C. Cain.

Mr. Grinnell exhibited a volume of Linnaeus' Systema Naturae, tenth edition, of 1758. By comparison with the fourth edition of the A. O. U. Check-list, 153 species of North American birds were found to have been first described in that work. President Kinsey recalled that early records of aviculture show that European ornithologists of the eighteenth and nineteenth centuries were familiar with many American species through the importing of caged birds. A letter which he had just received from M. Delacour stated that, whereas the Eastern Bluebird had long been known, specimens of the Western and especially the Mountain bluebirds had aroused great interest at the London Zoo. All but a very few of the 129 birds taken to European Zoos by M. Delacour had arrived safely.

The presence this month of a Harris Sparrow, an uncommon species in Berkeley, was reported. Miss Stedman recalled having seen a male Cardinal in her garden in Oakland last August and said that one was again present

February 12, 19, and 22, when she had the opportunity of hearing several of its different notes. Mr. Dyer reported the nesting of thrashers and said that an unmated Road-runner was rebuilding two of his last year's nests. Twenty Wood Ducks were reported seen in the southern part of Alameda County on February 21. Mr. Emlen had seen groups of thirty and fifty Wood Ducks in the Sacramento Valley. He also reported an albinotic Red-tailed Hawk, having the tail feathers white. The first recent record of a Burrowing Owl in Berkeley was given for January 10. Mr. Cain added the Chestnut-backed Chickadee, identified January 26, to the list of birds seen at the Boy Scout Camp sanctuary, Oakland, bringing the total to 44 species. There were several reports of Allen, Anna, and migrating Rufous hummingbirds. Mr. Richardson mentioned the pairing of Bush-tits in Strawberry Canyon since February 10; Mrs. Kelly told of a nest in Alameda; Mr. Kinsey said that the regularly flocking birds in Marin County were still in flocks.

Mr. Jean M. Linsdale spoke on "Conditions for Waterbirds in California." A relief map illustrated important areas throughout the state. His study was chiefly concerned with changes in habitats and in relative numbers of different species, in order to compare the present status of the birds with their former condition, insofar as that may now be determined. He indicated the principal refuges, classified types of hunting grounds, described current shooting practices which he had observed, and outlined the relation of waterbirds to agriculture.

Adjourned.—FRANCES CARTER, *Recording Secretary.*

SOUTHERN DIVISION

JANUARY.—The regular monthly meeting of the Southern Division of the Cooper Ornithological Club was held on January 26, 1937, at 8 p.m. at the Los Angeles Museum, with President Little in the chair and 26 members and guests present. Minutes of the Southern Division for December were read and approved. Minutes of the Northern Division for December were read.

In the absence of all members of the nominating committee, Howard Robertson reported for Dr. Miller and Lee Chambers, and he stated that Dr. Rich no doubt would concur with the others. It was the wish of the committee that the present officers be re-elected, to serve for 1937. It was then moved, seconded, and carried, that the secretary cast a unanimous ballot for the present officers.

Howard Robertson reported on the effect of the continued cold weather on birds in southern California, several individuals being reported either frozen or starved to death. Mrs. Michener reported three Audubon Warblers having died from the effects of the cold. She also reported the capture of a Cardinal and a White-throated Sparrow in a friend's trap. Miss Fossler said that the birds are evidently suffering from hunger, as they are coming around her kitchen begging for food. Mrs. Law had a pellet that had been disgorged by a shrike at Dr. Atkinson's window. It was given to Miss Fossler for examination and analysis. Dr. Wood reported on the manner the Hermit Thrushes in the Big Santa Anita Canyon were eating the holly berries. Paul Trapier told of the nesting in Utah of a Black-throated Sparrow, close to where a ditch was being dug; much dynamite was used, but the blasting did not seem to disturb the birds. President Little was to contact the Northern Division and establish a definite date for the Annual Meeting.

Adjourned.—SIDNEY B. PEYTON, *Secretary.*

FEBRUARY.—The regular monthly meeting of the Southern Division of the Cooper Ornithological Club was held at the Los Angeles Museum, Exposition Park, Los Angeles, on February 23, 1937, at 8 p.m. with 22 members and guests present. In the absence of both the President and Vice-president, J. R. Pemberton presided. Minutes of the Southern Division for January were read and approved. Minutes of the Northern Division were read. Applications for membership were: Willis E. Pequegnat, University of California at Los Angeles, by Loye Miller; Dean Hobbs Blanchard, Santa Paula, Calif., by John McB. Robertson; Robie W. Tufts, Wolfville, Novia Scotia, Canada, James Savage, Buffalo Athletic Club, Buffalo, New York, Compton Crook, P. O. Box 1216, Williamsburg, Virginia, and Harry H. Dutton, M.D., Fort Steilacoom, Wash., by W. Lee Chambers.

A letter from Dr. Wood, Secretary of the Federation of Natural Sciences, was read, and George Cantwell was appointed to represent the Southern Division at the meetings to be held the latter part of May in Los Angeles. Announcement was made that the dates of the Annual Meeting had been set for April 16 and 17; meetings to be held in Berkeley. Lee Chambers reported on the Hardware Dealers Convention that he had attended, and commented on the duck shooting that took place in the different districts of California, the past season. Several other members gave short accounts of their observations.

Adjourned.—SIDNEY B. PEYTON, *Secretary.*

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